GENERAL LIBRARY,
UNIV. OF MICH.
NOV 7 1908

Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Sound Waves, Telephone Magazine, and The Telephone

PUBLISHED WEEKLY BY THE TELEPHONY PUBLISHING COMPANY, MONADNOCK BLOCK, CHICAGO

VOL. XVI. No. 13

CHICAGO, NOVEMBER 7, 1908

10 CENTS PER COPY
$2 PER YEAR TO U. S. AND MEXICO
$3 PER YEAR TO OTHER COUNTRIES

COPYRIGHT 1908. ALL RIGHTS RESERVED

1889 Paris Exposition Medal for Rubber Insulation 1893 World's Fair Medal for Rubber Insulation

OKONITE TRADE MARK REG. U.S. PAT. OFFICE

THE STANDARD FOR RUBBER INSULATION

OKONITE WIRES, OKONITE TAPE, MANSON TAPE, CANDEE PAT'D POTHEADS

THE OKONITE CO., Ltd. Sole Manufacturers 253 Broadway, New York

WILLARD L. CANDEE, H. DURANT CHEEVER, MANAGERS, W. H. HODGINS SECRETARY GEO. S. MANSON, SUPERINTENDENT W. C. CANDEE, ASST. SECRETARY

OKONITE TRADE MARK REG. U.S. PAT. OFFICE

CONDUIT

P C C

CLAY PRODUCT COMPANY

Stock Exchange Bldg. CHICAGO

Standard Underground Cable Co.

Pittsburg Boston St. Louis New York Philadelphia
Chicago San Francisco Atlanta, Ga. Los Angeles, Cal.

BARE AND WEATHERPROOF COPPER WIRE AND CABLE

Rubber Insulated Wire and Lead Covered Cable

We Furnish, Install and Guarantee Everything Connected with

TELEPHONE WIRE AND CABLE ACCESSORIES

McROY CONDUITS

CHICAGO ROOKERY BUILDING

KERITE

Insulated Wires and Cables

1850 DAYS KERITE 1908

The Insulation which has withstood successfully the test of half a century

W. R. BRIXEY, Sole Manufacturer

HUDSON TERMINAL

30 Church Street, NEW YORK

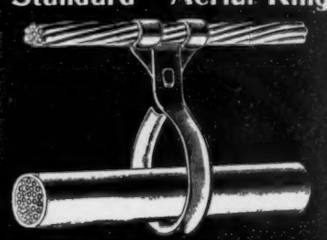
CHICAGO TELEPHONES SATISFY

CHICAGO TELEPHONE SUPPLY CO.

FACTORY AND GENERAL OFFICES

ELKHART, IND. U.S.A.

Save cross-arms by using our "Standard" Aerial Rings



for supporting either aerial cable or insulated service wires. These rings are guaranteed not to slip on the supporting strand when cable is being installed. May be applied by ordinary gas pliers. Prompt deliveries guaranteed. In ordering state diameter of supporting strand used.

YONKERS SPECIALTY CO.
Yonkers, N. Y.

"DETROIT" RUBBER COVERED WIRES

Telephone Pair a Specialty

DETROIT INSULATED WIRE CO.
Detroit, Mich.

PLATINUM

Wire, Sheet, Rivets and Contacts

Send for Literature

BAKER & CO., Inc., Newark, N.J.
N. Y. Office: 30 Church Street

TELEPHONE CABLE

WATERBURY CO., 69 SOUTH STREET, NEW YORK CITY

ALPHABETICAL INDEX TO ADVERTISEMENTS ON PAGE 19

Simple and *Scientific*

We ship fresh goods to you direct from our factory

Bulletins

No. 15. — The Construction of Dry Cells

No. 16.—The Dry Cell and the Telephone Manager

Sent on Application

FLEUR DE LIS DRY CELL

FOR TELEPHONE SERVICE

French Battery & Carbon Co., Madison, Wis.

The Indiana Rubber & Insulated Wire Co.

MANUFACTURERS OF

PARANITE TRADE MARK

Insulated Wires and Cables

JONESBORO, IND.

We Make Toll Tickets by the Million

By means of new facilities just acquired, and thus produce them better and cheaper than can be done in small lots. We can furnish them promptly in any quantity, on better paper, put up in better shape, and at LOWER PRICES THAN EVER BEFORE OFFERED.

WE ALSO FURNISH

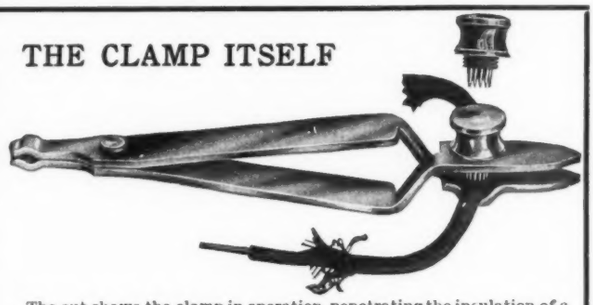
Lease Records
Toll Journals
Toll Ledgers
Monthly Check Reports
Cash Books
Directories
Trouble Tickets
Rental and Toll Bills
Voucher Checks
Card Index Systems
Steel Telephone Signs
All kinds of Blanks, Forms and Books for Telephone and Toll Line Accounting.

Write for Sample Forms and Prices.

THE TELEPHONE PRINTING COMPANY

DEFIANCE, OHIO

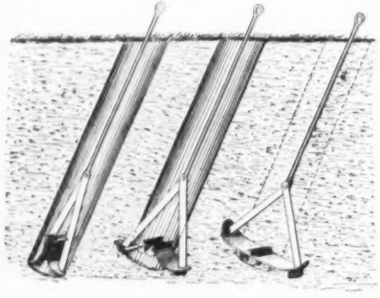
THE CLAMP ITSELF



The cut shows the clamp in operation, penetrating the insulation of a wire and making contact with conductor inside. The stud is shown separately to illustrate that it is removable and renewable. It will be noted that it is designed to screw into one jaw of the clamp. Should the points break or grow dull through constant use, additional studs may be had. Send 75c. for a set of two, postpaid. Your money back if you want it.

The Williams Test Clamp Co., 720 Electric Bldg., Cleveland, O.

INDIANA GUY ANCHOR



Easily Planted

Can't Pull Out

Let us prove to you it is the best Anchor made

The Royse Electric Co.

Indianapolis, Ind.

The Sweetheart of the Storm

Chapman Lightning Arrester

Manufactured by

Minnesota Electric Co.

Minneapolis, Minn.

Selling Agent, H. E. COBB,
1530 Monadnock Block, Chicago, Ill.

The Wire of Quality

TELEPHONE WIRE

Best by Every Test

A Difference in Wire makes a Difference in Service.

LONGEST LIFE—HIGHEST EFFICIENCY

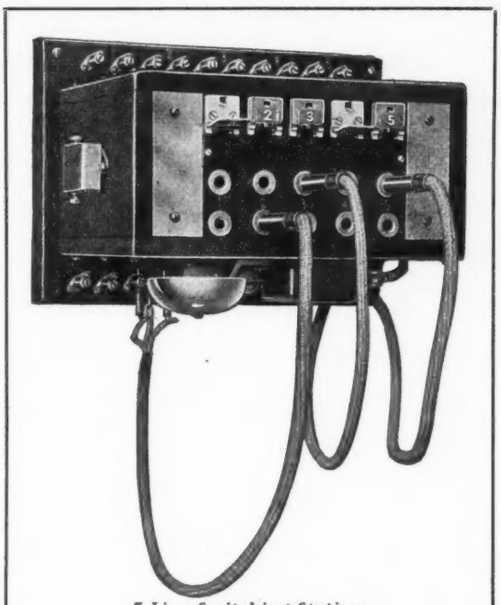
Universities have tested our wire and found it of the highest quality. Leading Telephone Companies use it, with perfect satisfaction in most exacting service.

Write for Samples and Prices Today

Handled by Representative Jobbers and Supply Houses

INDIANA STEEL & WIRE COMPANY

MUNCIE, INDIANA



5 Line Switching Station

OUR five and ten line switching stations are manufactured with the greatest care and are guaranteed to give perfect service.

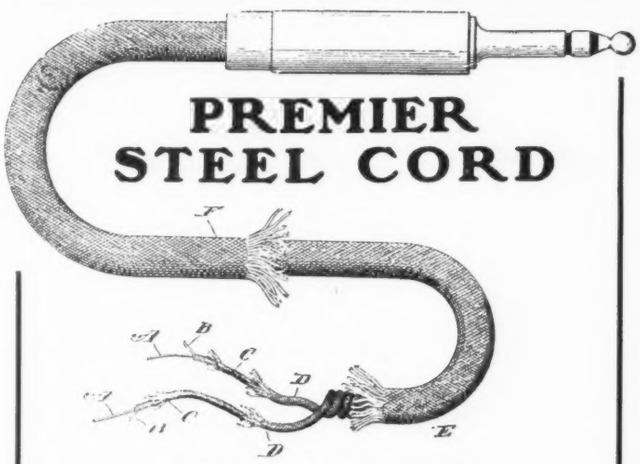
The relay drops give code signals and when lines are connected line drops act as clearing out signals.

WE HANDLE A COMPLETE LINE *of* TELEPHONE APPARATUS *and* CONSTRUCTION MATERIAL

It will pay you to get OUR prices before purchasing.

Commercial Electrical Supply Co.

Fifteenth and Pine Streets **ST. LOUIS, MO.**



PREMIER STEEL CORD

ALWAYS IN ALIGNMENT

In the hollow of the cord at the plug end, there's a reinforcing spring made of the highest grade spring steel. Not only does this prevent the conductors from being thrown out of alignment, but it also makes it practically impossible to break the cord at the plug end, and that's where the strain is greatest. Operators don't have to be careful when you use Premier Steel Cord—it'll last in spite of shamefully careless usage. Better get details.

Runzel-Lenz Electric Mfg. Co.

97-101 South Clinton Street, Chicago

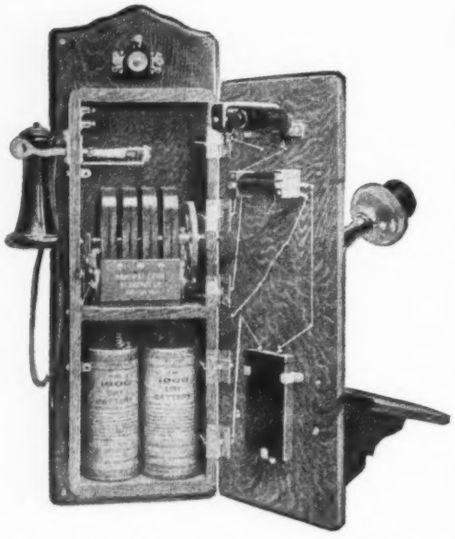
Five Men on a 95 cent **PEIRCE SEAT**

We make six designs of seats, three all steel and three with wood seats.

Get circulars.

Peirce Specialty Co.

ELKHART, IND.



WHEN YOU order a Cracraft, Leich Telephone, you can rest assured that you will not only receive a telephone that is properly designed, but also one that is properly made. None but the best of materials are used in its construction. Our manufacturing department is equipped with the proper tools and gauges, making our product uniform and reliable.

We make every part of this telephone except the cabinet. The cabinet is made per our specifications and is the best we can buy. Telephones shipped with or without batteries as desired. Write to us. We can be of service to you.

Cracraft, Leich Electric Co., Genoa, Ill.

JUST WHILE THEY LAST

We offer a superior telephone at an inferior price. Our stock of 200 Magneto Call, Common Battery type telephones, with Regular STANDARD equipment, are going at

Just $9.00 Only

No. 60

Regular Price $13.00
Special Price 9 00
You make $ 4.00

Never before did $9 00 buy so much telephone.

Write for special descriptive bulletin which tells the reason why

The Standard Telephone Mfg. Co., Portsmouth, Ohio
Successors to
The Williams Telephone & Supply Co., Cleveland, Ohio

If You Consider THE POOLE Lock-Out System

as an addition to party-line service, you are wrong. It is not something added—it is a feature which has always belonged to good service. It unfailingly gives absolute

SECRECY

to any of the parties on the line. It gives the subscriber all the advantages of a private line at the cost of a party line. It enables you to put more parties on a line, and get higher rates.
Now, do you want details?

Mountain State Electrical Co.,
Wheeling, W. Va.

150-Line Unit Type Magneto Switchboard

EQUIPPED WITH

No. 8 Self-Restoring Gravity Drops

¶ It will pay you well to take a keen interest in the numberless LASTING and ECONOMICAL FEATURES of Quality Apparatus—especially in this form of MAGNETO SWITCHBOARD. Besides being a well designed switchboard cabinet, of well-seasoned kiln dried Golden Oak, of our own selection, the arrangement of all apparatus is such as to provide the greatest accessibility and an ultimate capacity of equipment in the least cabinet space.

¶ Take up every point in the construction of this Magneto Switchboard—then get our latest prices on a switchboard of this type, equipped to meet your requirements.

¶ If there is any further information YOU desire, we want YOU to call on us and assure YOU of our best interest in YOUR behalf AT ALL TIMES

No. 5A—Operator's Transmitter Arm—An adjustable extension arm made of seamless brass tubing—highly nickel-plated and constructed rigidly—equipped with two **No. 10—5-foot Transmitter Cords** and **No. 1 Cord Weights.**

No. 34 Escutcheons—When the equipment ordered partially equips the switchboard panel the unequipped space is filled in with blank metal escutcheons as illustrated. These are instantly removable.

No. 8 Self-restoring Gravity Drop—The ingenious feature of all our Magneto Switchboards. A gravity drop that consists of few well-designed parts—positive action and is sensitive and reliable. **Ask for further particulars and booklet.**

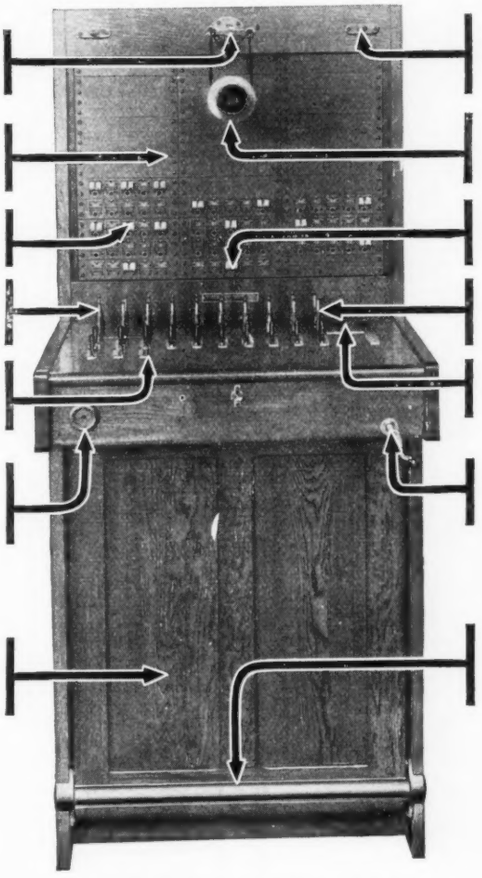
No. 36—Plug and No. 78—6-ft. Cord—The rear plug of the cord pair is known as the answering plug. No. 2 Cord Weights are furnished with each cord. The cords in these switchboards never give trouble and will outwear all other makes.

No. 30—Key—The ringing and listening keys are of the vertical type. There are no floating contacts in these keys and ample insulation is provided.

No. 58—Operator's Jack—This part of our operator's equipment is a carefully insulated piece of apparatus. The complete equipment consists of this jack, a No. 15A Receiver and No. 87—6-ft. Cord with No. 40 Plug attached.

No. A5360—Switchboard Cabinet—All our switchboard cabinets are made in our own factory. The general dimensions of this cabinet afford an operator easy access for a greater number of jacks or subscribers' lines than any other board of the same capacity. Write for further particulars and booklet.

No. 152—Key mounted in this cabinet eliminates clearing out drops.



No. A 5360—150-Line Switchboard Cabinet.

No. 28 Key—The key located on the top panel in the right-hand side is the Generator Switch. The **No. 21 Key** located in the left-hand side is the Night Bell Switch.

No. 8B — Operator's Transmitter—Identically the same interior construction as our No. 7 Transmitter. A leading product producing the maximum volume of voice transmission with excellent articulation. Does not pack—absolutely moisture proof.

No. 9—Clearing-Out Drop—These drops are mounted five per strip the same as Line Drops. Our new No. 152 Key combining the clearing-out drop and ringing and listening key may be furnished when specified.

No. 36—Plug and No. 78—6-ft. Cord—The front plug of the cord pair is known as the calling plug. We have been making plugs for a good many years and know how to make a plug that does not become disassembled in operation.

No. 1—Plug Hole Stops—The key-shelf is drilled for an ultimate of twelve pairs of cords. All unequipped pairs are provided with these removable bushings made of hard rubber.

No. 57—Generator—The high voltage output of our generators and their greater permeability make them the preferred article for dependable ringing service. A special crank handle and shaft is provided with this generator.

No. 9—Foot Rail Bracket—Furnished with this type of cabinet, including 1¾-inch seamless polished brass rail. This additional feature for a Magneto Switchboard will be found convenient and particularly characteristic of the best designed Magneto Switchboard.

No. 152 Key is a combination ringing and listening key and clearing out signal.

We will accept YOUR order for immediate delivery IF you will accept OUR standards. You are taking no chances.

IF YOU CAN NOT ORDER TO-DAY, AT LEAST ASK FOR PRICES.

See our exhibit, Auditorium Hotel, Chicago, Rooms No. 642-644.

International Independent Telephone Association Convention, Dec. 1-2-3, 1908.

STROMBERG-CARLSON TEL. MFG. CO.

ROCHESTER, NEW YORK, U.S.A.

CHICAGO, ILL. KANSAS CITY, MO.

We Solicit Investigation

The following extract from a letter received by us from a prominent telephone manager speaks for itself:

"Having visited a number of exchanges in Ohio and Pennsylvania where your selective party line apparatus is in operation, it gives me pleasure to be able to report that in every case, we found the System giving ENTIRE satisfaction to both the TELEPHONE PATRONS and also to the MANAGERS of the Exchanges which we visited."

Homer Roberts Telephone Co.

1703 Melrose Street, : : : : Chicago

WANTED

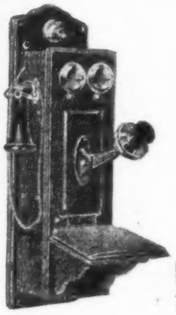
To Manufacture on Contract
or
Manufacture and Sell on Royalty

any practical metal specialty of general use, which can be made in a first-class well equipped machine shop

Long Distance Telephone Manufacturing Co.

SOUTH BEND, IND.

A TELEPHONE



Intelligently and honestly made will necessarily have trouble causes eliminated.

We manufacture such a telephone.

We also rebuild telephones; like persons, every old telephone has some good points.

We take these good things, put good new things with them and make a good, new, rebuilt phone that costs you less money than a complete new phone.

WRITE US ABOUT IT

INDEPENDENT TEL. MFG. CO.
MADISON, : : WIS.

"REBUILT"

TELEPHONE EQUIPMENT
is "REBUILT" not "REPAIRED"

One's like "New," the other's "Old"—always will be

Our "Rebuilt" Equipment Department "Rebuilds" Switchboards—Telephones—Apparatus—Additional Switchboard Equipment—and Handles—Wire—Cable—Cords—Everything Telephonic.

GUARANTEED SAVING 30 TO 50 PER CENT

Get Quotations, and if you want our 'Rebuilt" Bargain Bulletin sent you regularly—say so—it's FREE. *Address*

"REBUILT" EQUIPMENT DEPARTMENT

PREMIER ELECTRIC CO.

VAN BUREN & CLINTON STS. CHICAGO, ILL.

Remember "Rebuilt"—Not Repaired

Please tell the Advertiser you saw his Announcement in TELEPHONY.

Everything Accessible

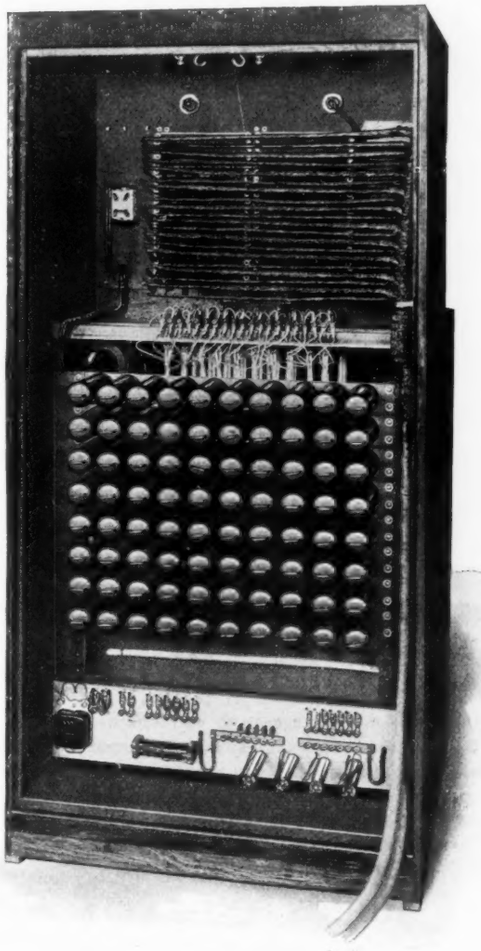
An Important Feature in Private Branch Equipment

The relays are mounted on metal strips extending across the back of the board in a convenient position.

A removable panel in the front of the board makes it possible to reach the relay connections easily and quickly.

The cord rack is unobstructed and all connections can be reached readily.

The cables are so fanned out that all lamp and jack connections are extremely accessible.



Owing to the compact construction of the relays, a large number of them can be mounted in a small space without crowding.

The dust proof cap can be removed from any one by a slight twist.

A locking lever holds the armature in place. By raising this lever the armature and coil can be removed.

Not a tool is required to take the relay apart.

Every practical telephone man acknowledges that the Monarch Company has a faculty of building apparatus that is "easy to get at." This quality is uniformly in evidence in all Monarch apparatus, whether it be common battery or magneto.

Accessibility has a dollars and cents value
Let us know when you are next in the market

MONARCH TELEPHONE MANUFACTURING CO.

Factory and General Offices: Washington and Morgan Streets, Chicago, Ill.
Branch House: 177 Main Street, Dallas, Texas

Please tell the Advertiser you saw his Announcement in TELEPHONY.

New Bulletin No. 26 Just Out

Showing Our "PRIMO" SWITCHBOARDS

MAILED FREE

Write To-day

Central Telephone and Electric Co.

St. Louis—Dallas

Makers of High Grade Telephone Apparatus

If You Have Money to Burn

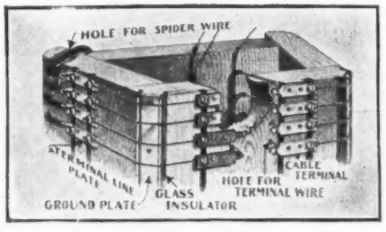
it does not make any difference to you whether your telephones get out of order or not, but if you are in business to make money, not to spend it, the best telephone you can get is the one you want to buy. The Andrae Special Heavy Giant will last more years with less repairs, ring stronger and talk further than any other telephone to be bought at any price.

It is easy to prove this. Put one or two on your lines and compare them with others and then ask for our guarantee.

JULIUS ANDRAE & SONS CO.

48 Years Keeping Money Out of the Fire at MILWAUKEE, WIS.

Fuse Prices Cut to Pieces



Fuse for this Terminal cost only **5** cents per 100.

NEW DESIGN

Get our new Illustrated Catalogue.

THE PROTECTIVE ELECTRICAL SUPPLY CO.

FORT WAYNE, IND.

The efficiency of an operating force

is fully revealed by properly taken peg counts. Other equally valuable data is thus secured. The

Veeder Counter

makes it easy to learn such factors. The details are interesting. Write for our telephone booklet.

VEEDER MFG. CO.

11 Sargent Street, Hartford, Conn.

Manufacturers of Cyclometers, Odometers, Tachometers, Tachodometers, Counters, and Fine Castings

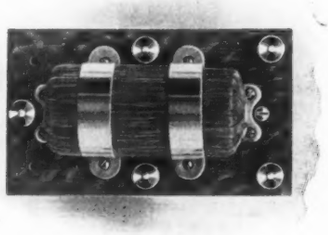
Represented in Great Britain by Messrs. Markt & Co., Ltd., 6 City Road, Finsbury Square, London, E. C., England

Please tell the Advertiser you saw his Announcement in TELEPHONY.

PHANTOM

YOUR TOLL LINES WITH

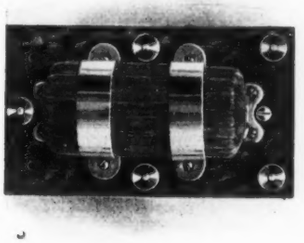
Ericsson Duplex Transformers



Increased Profits

with

No Added Investment



Ericsson Phantom Circuit Transformer No. 1

Ericsson Phantom Circuit Transformer No. 1

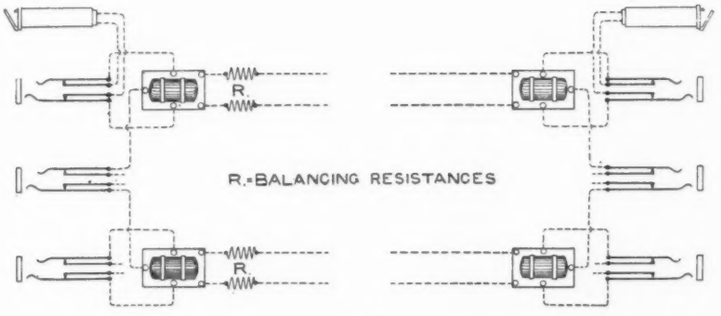
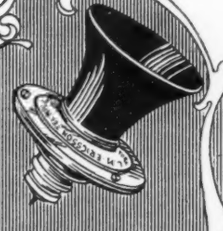


FIG. 2

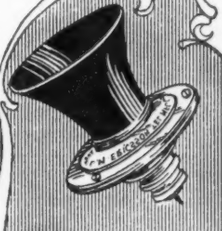
We guarantee these transformers on clear and properly constructed lines.

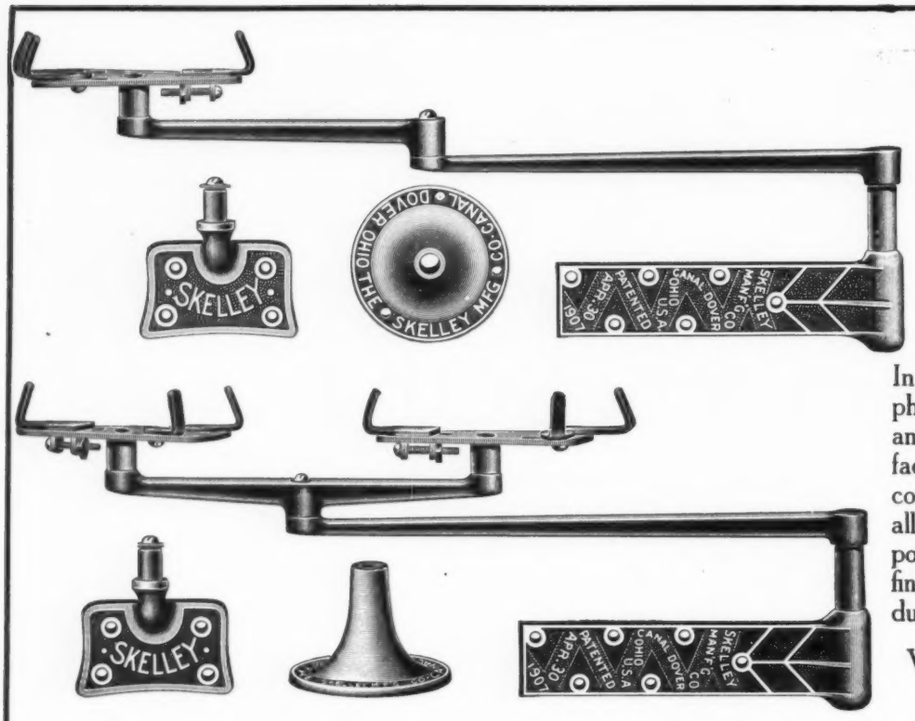
Write for descriptive circular and net prices



L. M. ERICSSON TEL. MFG. CO.

BUFFALO, N.Y.





The Improved Skelley Telephone Holders

For One or Two Telephones

In making a choice of Telephone Holders, action, finish and durability are important factors. The Skelley Holder combines the best features of all the others and has no bad points. Its action is perfect, in finish it is second to none. In durability it is easily first.

Write us today for circular and prices.

The Skelley Manufacturing Co.

Davis Avenue and Fifteenth Street **Canal Dover, Ohio**

THE WESTINGHOUSE STORAGE BATTERY

Ask for Catalog 256-J

The Westinghouse Machine Company

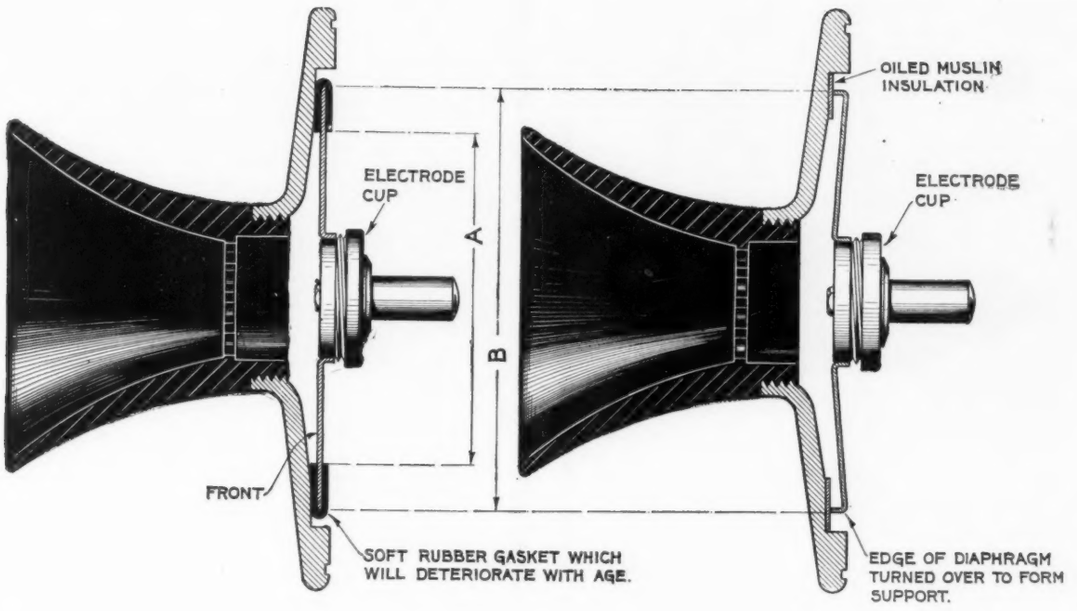
Storage Battery Department
East Pittsburg, Pa.

Gould Telephone Storage Batteries

DESIGNED with a full understanding of the conditions of telephone service and built electrically and mechanically to meet these demands.

Gould Storage Battery Co.

MAIN OFFICES: 341-347 Fifth Ave., New York City
Works, Depew, N. Y.
SALES OFFICES: Chicago—Rookery Building
Boston—89 State Street
San Francisco—Monadnock Block
Toronto, Ont.—2 Bloor St., E.



Voice Vibrations

¶ In all solid back transmitters heretofore manufactured, the diaphragm is insulated from the front by a soft rubber gasket. When new, this gasket allows the diaphragm to vibrate freely throughout its entire surface.

¶ However, the diaphragm area exposed to voice vibrations, is limited to that portion not enclosed by the gasket. This surface is indicated by A.

¶ Soft rubber hardens with age.

¶ And, deterioration of the gasket throws the entire diaphragm out of adjustment. It reduces the area of the vibrating surface and even has a dampening effect upon A.

¶ The Indestructible Transmitter has no rubber gasket.

¶ The edge of the new diaphragm is curled over to form a support.

¶ Voice vibrations strike the entire surface (B) of the diaphragm, proportionately increasing the volume of transmission.

¶ This wonderful efficiency is lasting, since time or climate cannot mar any of the material.

¶ The insulation is a strip of special oiled muslin, which will withstand 10,000 volts. It is as stable as steel.

¶ Therefore

¶ The adjustment is permanent.

¶ These features should be of vital interest to you—the reliability and life of any telephone depends largely on the transmitter.

¶ All Dean telephones are provided with

The Indestructible Transmitter

¶ Give us a trial order.

The Dean Electric Company
Elyria, Ohio, U.S.A.

San Francisco Kansas City

Your dreams

can be realized.

Dreams are slumbering **ambitions** waiting for **opportunity.**

Opportunity is a force, visible only to those who are **ready** to grasp it. Your **opportunity** is right in front of you—the firm is just waiting for you to **prove up.** They don't care **who** you are—it's **what** you are.

A better position is waiting for you—**more pay**—shorter hours—cleaner and easier work—**authority**—just what you have been looking forward to and dreaming about.

PREPARE YOURSELF FOR THIS ADVANCE.

The American School of Correspondence will help you. This school has helped thousands to a better and brighter future; to qualify for positions with shorter hours, easier and cleaner work and larger pay. Our courses in Telephone Practice, Telegraphy, Electrical Engineering, and Drafting are exceptionally complete and practical—just what you need. We give the most comprehensive instruction in the usual work and lay particular stress on the course on the operation and construction of the **Automatic Telephone.**

Our **"Home Study"** course is just what **you** need to occupy your time during the long winter evenings. Bright, pleasant, interesting studies, that will rest you after a hard day's work. The lessons are never long enough to tire. They are written by practical, technical men.

Pick out the course that suits your taste and present employment—put your "X" before it today with a determination to make every spare moment **count** until your DREAMS ARE REALIZED.

WE HELP MEN HELP THEMSELVES.

AMERICAN SCHOOL OF CORRESPONDENCE

CHICAGO, U. S. A.

FREE INFORMATION COUPON

Clip and Mail Today

American School of Correspondence

Please tell me how I can fit myself to earn a good salary in the line of work marked "X."

—Telephone Engineer	—Surveyor
—Electrical Engineer	—Hydraulic Engineer
—Mechanical Engineer	—Irrigation Engineer
—Boiler and Sheet Metal Pattern Draftsman	—Superintendent of Construction
—Heating and Ventilating Engineer	—Resident Engineer
—Civil Engineer	—Steam Engineer
—Architect	—Structural Draftsman
—Architectural Draftsman	—City Engineer
—Contractor and Builder	—Bridge Engineer
	—College Preparatory Course

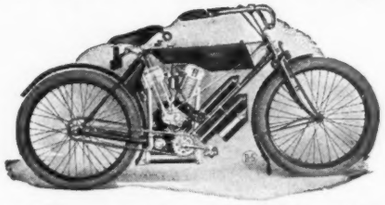
Name .....

Address .....

Occupation .....

Telephony11-7 08

"R.-S." Motorcycle



THE IDEAL MACHINE

For Telephone Companies, Line Men, Trouble Hunters, Collectors, Etc.

Can be fitted with R.-S. luggage carrier.

Powerful, simple, practical, economical, reliable.

The first and only real Mechanical Intake Valve Motorcycle made and marketed in the United States. Thousands in successful use. The only Motorcycle to climb Pike's Peak. Full of practical features and improvements.

The "R.-S." line comprises Single and Twin Cylinder machines, Tandems, Tricycles, Tri-Cars and Delivery Vans, and represents the most value as well as the most advanced motorcycle construction.

Hundreds of testimonials from every part of United States showing "R.-S." achievements in racing, record making, hill climbing, and endurance tests, sent *free* with complete illustrated catalogue, on request to Dept. A. T.

Reading Standard Company, Reading, Pa.

Makers: The Renowned Reading-Standard Bicycle

HELLO!

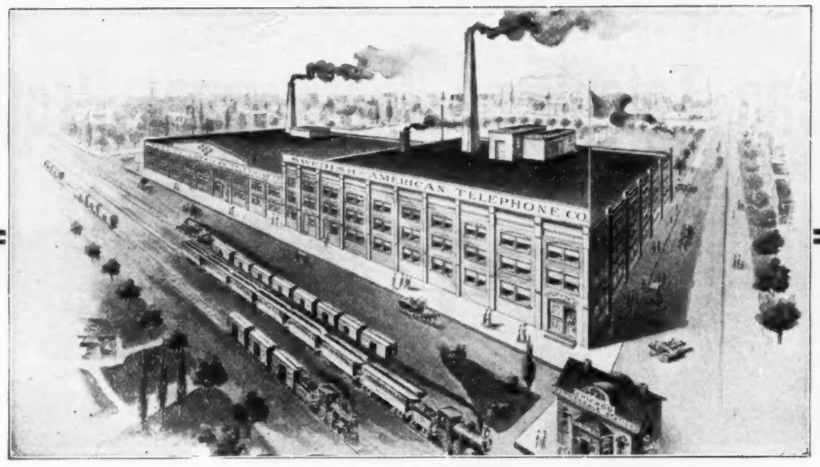
Want a "Trouble" Wagon?

LISTEN—

This wagon made 616 miles during 20 days—No delays—No trouble—Oil cost $8.67—Repairs 70 cents—Saved one man's time and reduced livery expenses 70%. You can't afford to be without one. Write today. A few details—double cylinder, opposed, 4 cycle, air cooled, planetary transmission, chain drive, 16 H. P., wheel steer, solid rubber tires. Always ready—no hitching or unhitching—good in all weather on all roads summer and Winter—a great hill climber. **Write today for Catalogue 100**

W. H. KIBLINGER CO., Auburn, Indiana

New York Office and Salesrooms, 257 Broadway
H. H. Woodrough, Mgr.



We Own Factory Building Above Illustrated---200,000 Feet of Floor Space

There can be but One Result

when you investigate and buy Magneto equipment—for merit's sake. We have the facilities, ability and responsibility to care for your needs promptly and satisfactorily. Telephone buyers that are not fully conversant with our facilities and familiar with our product owe it to themselves to find out.

¶ Telephones supplied by us give satisfactory results. We can furnish an abundance of evidence from the users to this effect.

¶ The switchboards that we supply contain features of merit and distinct advantage not found in other makes. If you contemplate the purchase of equipment, don't you think it will be good business to inform yourself of what we have to offer? Our prices, specifications, blue prints, literature, will go forward on receipt of your inquiry.

¶ We have a great deal of money invested in the manufacturing end of the Telephone business. You have in the operating end. Our interests are mutual and we leave it to the business judgment of the individual reader of this advertisement, whether it is better business to be indifferent to a really good proposition, or investigate and keep yourself informed. This space is too small to enter into a lengthy description and discussion of equipment, but we believe that the company or individual that really wants to find out and know, will not hesitate to spend a few minutes in writing us. Your letter will receive our prompt, personal attention.

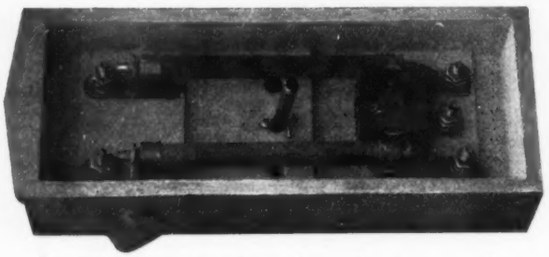
Swedish-American Telephone Co.

KANSAS CITY, MO. Dept. T, CHICAGO

See Our Exhibit at Telephone Convention, December 1-2-3

American Telephone Instrument Protectors

APPROVED BY FIRE UNDERWRITERS' BOARD



No. 997. American Fuse Box. Cover removed

A fuse box for "out-of-doors" use, made all of porcelain, with tubular fuses and large self-cleaning carbon lightning arrester. Very strong and compact.

No. 997. With cover in place

The cover for No. 997 is made of iron, painted red. It is fitted with a rubber gasket and has overlapping edges. It is perfectly waterproof.

The National Board of Fire Underwriters have drawn up specifications for the manufacture of Telephone Instrument Protectors, and the American No. 997 Protector is made under those specifications. When correctly installed it entitles the user to a reduced fire insurance rate.

AMERICAN ELECTRIC FUSE CO.

NEW YORK, N. Y. MUSKEGON, MICH.

THE New Weston Alternating Current Switchboard

AMMETERS and VOLTMETERS will be found vastly superior in **accuracy, durability and workmanship** to any other instruments intended for the same service.

They are
ABSOLUTELY DEAD BEAT
EXTREMELY SENSITIVE
PRACTICALLY FREE FROM TEMPERATURE ERROR

Their indications are
PRACTICALLY INDEPENDENT OF FREQUENCY, and ALSO OF WAVE FORM

They require
EXTREMELY LITTLE POWER FOR OPERATION
and are
VERY LOW IN PRICE

Correspondence concerning these new Weston Instruments is solicited by the

WESTON ELECTRICAL INSTRUMENT CO.

New York Office:
74 Cortlandt Street

Waverly Park, NEWARK, N. J.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

Central Energy Telephones
for Long Distance Exchange Service

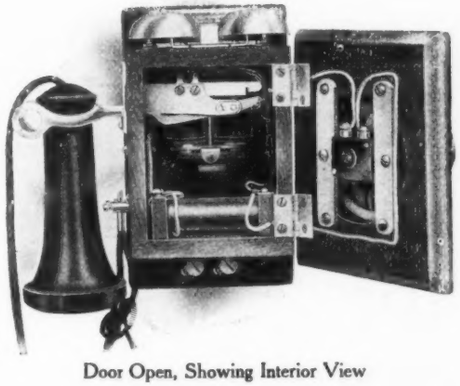
For Hotels, Schools and Residences

Closed View

Most Compact and Most Accessible Phone Ever Built

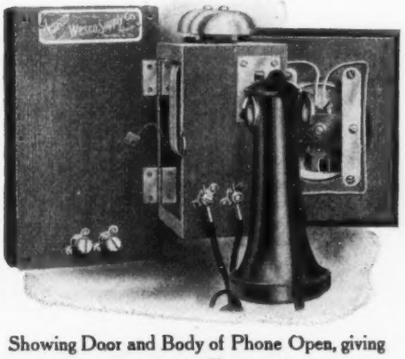
Absolutely the smallest, yet most perfectly constructed 'phone of its type on the market

Send us your specifications covering your requirements on complete Central Energy



Door Open, Showing Interior View

Lamp Line Equipments for Hotels, Schools, Etc.



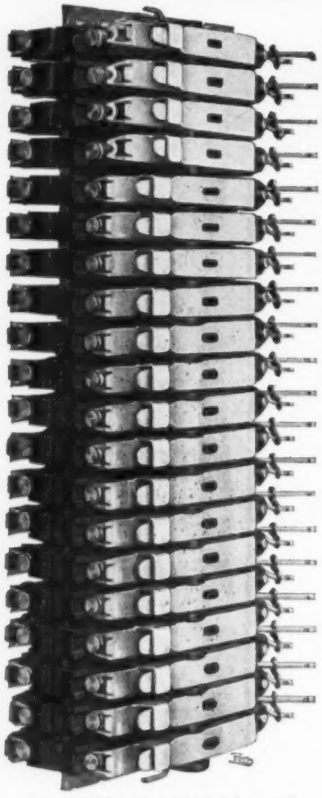
Showing Door and Body of Phone Open, giving access to all parts

The Wesco Supply Company

Manufacturers

High-Class Telephone Apparatus

Main Office and Factory: St. Louis, Mo. Branches: Fort Worth, Tex., and Birmingham, Ala.



20-PAIR BANK No. 10

200,000

No. 10

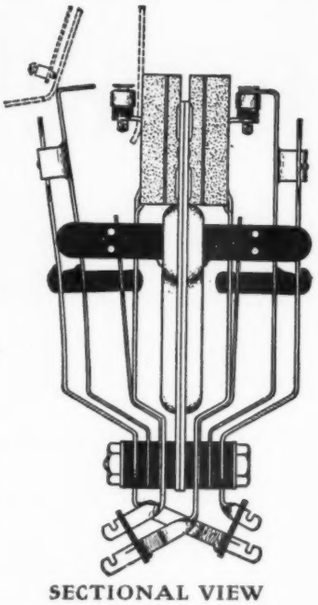
Cook Protectors

IN USE

16,000 Pairs installed at St. Louis, with only 19 Cases of Trouble

Is a resoldering Protector.
Has ONLY One Contact in the Circuit.
Coils NEVER Burn Out or Short Circuit.
Resoldering a Coil Tests it Automatically.
Many Other Points You Should KNOW About

WRITE FOR BULLETIN AND PRICES



SECTIONAL VIEW

Frank B. Cook

242 W. LAKE STREET CHICAGO, ILL.

OKONITE TRADE MARK REG. U.S. PAT. OFFICE

THE STANDARD FOR RUBBER INSULATION

OKONITE TRADE MARK REG. U.S. PAT. OFFICE

1889 Paris Exposition Medal

OKONITE
TRADE MARK
REG. U.S. PATENT OFFICE.

1893 World's Fair Medal

OKONITE WIRES MANSON TAPE
OKONITE TAPE
CANDEE WEATHER-PROOF WIRES
CANDEE PAT'D POT HEADS

WILLARD L. CANDEE, H. DURANT CHEEVER, } Managers

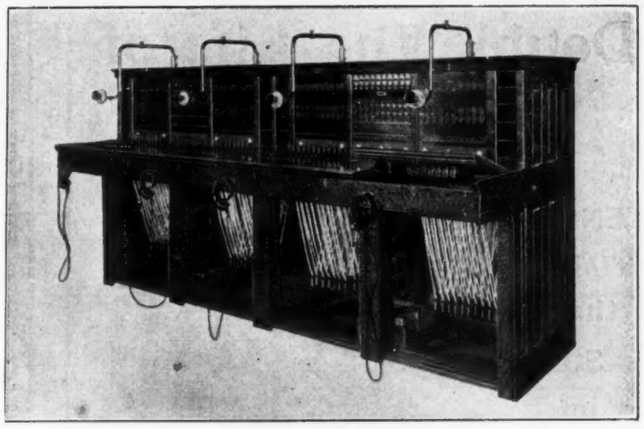
GEO. T. MANSON, General Superintendent
W. H. HODGINS, Secretary
W. C. CANDEE, Asst. Secy.

SOLE MANUFACTURERS

253 BROADWAY **THE OKONITE CO., LTD.** NEW YORK CITY

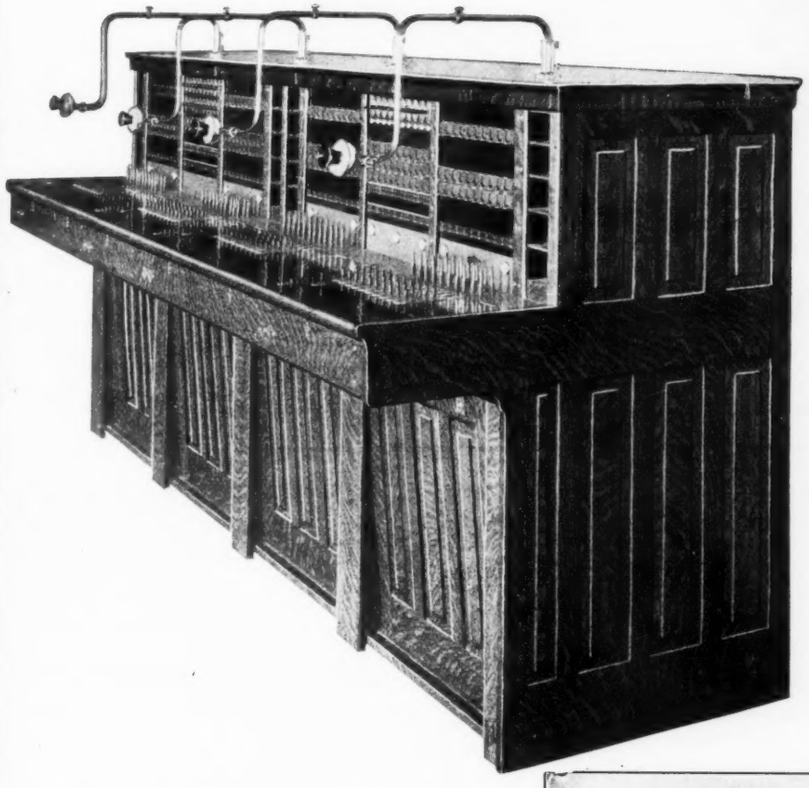
Please tell the Advertiser you saw his Announcement in TELEPHONY.

Four Position Toll Board



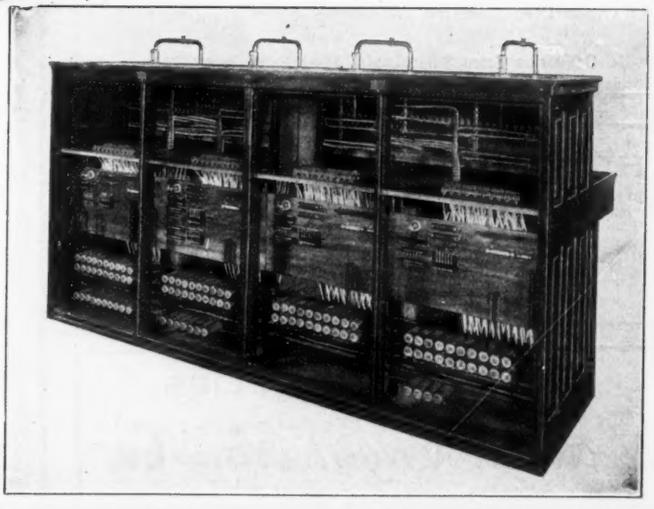
If you are going to buy either a new switchboard, a toll board or a private branch exchange board

GET OUR PRICES



STERLING ELECTRIC COMPANY

We make anything in the line of Telephone Equipment



STERLING

ELECTRIC COMPANY

LA FAYETTE, IND.

Good Goods

Double the Life of Your Poles

TEN TIMES the Strength of Creosote

ANTISEPTINE
Regis. U. S. and Can.

Doubles the Life of Poles and Cross Arms
The Perfect Cold, Hot Brush and Open Tank Timber Preserver

AMERICAN WOOD PRESERVING CO.
Incorporated 1892
430 THE ROOKERY CHICAGO
Phone Harrison 1345
Write For Full Information

"C. A. Wood Preserver" (Carbolineum America)
Is composed of over 90% of the highboiling oils, guaranteed to meet most rigid specifications for wood preserver
Prompt shipments from stocks at New York, New Orleans, St. Louis, San Francisco, Salt Lake City and Galveston.
Reg. U.S. Pat. O. Nos. 22396-51987
C. A. Manufacturing Co. AUSTIN, TEXAS Masonic Temple

"THEY NEVER PULL UP"
THE MILLER SAFETY ANCHOR
Ask Nearest Jobbing House for Prices. One Dozen on Trial. Freight Prepaid.
Write for Catalogue
THE MILLER ANCHOR CO., NORWALK, OHIO

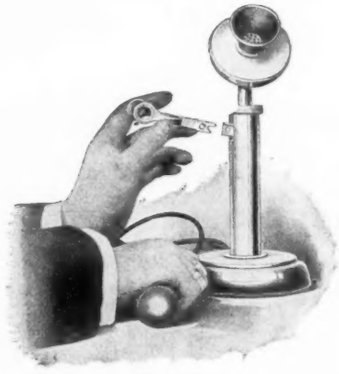
ASK US TO GIVE
some reasons why it will pay you to specify "AMERICAN" Storage Cells. To charge from an alternating current circuit you need an "AMERICAN" Electrolytic Rectifier. We make them---low-priced, guaranteed to do the work.
American Battery Company
174 S. CLINTON STREET, CHICAGO, ILL.
Established 1889

Kettle River Quarries Co.
GENERAL OFFICES
Minneapolis. Minnesota
MANUFACTURERS OF
CROSS ARMS - PINS - BRACKETS
TREATED—UNTREATED PAINTED—UNPAINTED
PLANTS AT
SANDSTONE, MINN. MADISON, ILL.
Deliveries From Saint Louis, After April First, 1909

HOW TO LOCATE TROUBLE
on grounded and metallic lines, test resistances of coils, ringers, etc., with a voltmeter, described in our new catalog. Send for it. It's free.
L. M. PIGNOLET
80 Cortlandt Street New York
Manufacturers of
Voltmeters, Ammeters and Volt-Ammeters

TELEPHONE SUPPLIES
Electrical Engineering Co.
MINNEAPOLIS, MINN.
Prompt Shipments Right Prices

MONEY SAVED
ON DESKS STANDS
WATCH THIS SPACE EVERY WEEK
PROFIT BY OUR 14 YEARS EXPERIENCE
Get a Sample Stand and compare it with others



3

The hook lever is the part that usually "gets it" when the stand is knocked over, so we put this on with a screw. Another lever can be put on in an instant, as shown. No adjustments.

WHY do some stands pull apart into many different pieces? You can't test them when they are apart, and can't see the parts when they are together? What's the use?

Get our Bulletin No. 63

The Sumter Telephone Mfg. Co.
SUMTER, S. C.

Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Sound Waves, Telephone Magazine and The Telephone

Vol. XVI CHICAGO, SATURDAY, NOVEMBER 7, 1908 No. 13

PUBLISHED EVERY SATURDAY BY THE

Telephony Publishing Company

Monadnock Block, Chicago

Telephone Harrison 2951

H. B. McMeal, President F. S. Kenfield, 1st Vice-President
W. H. Graffis, 2d Vice-President H. D. Fargo, Secretary-Treasurer

Edited by H. B. McMeal and Franklin H. Reed

The present publication comprises

Vol. 55	The Telephone	No. 13
Vol. 32	Telephone Magazine	No. 13
Vol. 18	American Telephone Journal	No. 19
Vol. 16	Sound Waves	No. 13
Vol. 16	Telephony	No. 13

TERMS OF SUBSCRIPTION:

United States, Cuba and Mexico.....per year, $2.00
Other Foreign Countries within the Postal Union..... 3.00

NOTICE TO ADVERTISERS

Changes of advertising copy should reach this office ten days in advance of date of issue. New advertisements accepted up to noon of Monday for the paper dated Saturday of the same week.

Copyright, 1908, by Telephony Publishing Company

Entered as second-class matter March 8, 1901, at the post office at Chicago, Ill., under act of March 3, 1879.

CHICAGO, SATURDAY, NOVEMBER 7, 1908.

CONTENTS.

Editorial 457
English Practice in Overhead Cable Construction. By N. D. Blagdon-Phillips 459
Plant Costs in Competitive Territory.....460
Three Greatest Benefits of Former Meetings. By J. A. Gustafson 463
Some Construction Pointers. By B. A. Deen.....464
Side Profits in Charging Automobile Ignition Batteries. By W. T. Powell.....466
Important Points for the Local Agent to Keep in Mind. By C. W. Ayers.....467
Necessity for Small Companies to Figure Profits.....467
Letters on Practical Subjects.....468
Determining the Relative Efficiency of Similar Equipment from Different Factories 468
Telephone Law. By A. H. McMillan.....469
Practical Questions and Answers.....470, 471
Telephone News 471, 472, 473
Telephone Patents. By Max W. Zabel.....474, 475
In the Manufacturing Field.....475, 476
Condensed News Reports.....477, 478

The Practical Worth of the Convention.

Early announcements of the program for the International Convention sound businesslike. In fact, it looks decidedly as if the men in charge of operating telephone plant would get much better results on their expenditure of both time and money, represented in the trip to Chicago, than has ever been possible before. This will result from the definite and prominent place on the program assigned to the conferences on practical subjects.

The development of a feeling that the topics considered at the convention should be those most intimately connected with the larger every-day problems of the operating men has been going on for some time past. In so far as the regular proceedings at previous conventions have been unfavorably criticised, it has been for the reason that they did not give a man a greater number of ideas which would help to make him more successful in his work. And last year the papers which received the most favorable comment, and which were put to best use after the meeting by the men who heard them, were those which were simply narratives of the experiences in particular lines of work of a number of able men.

This year we are taking a step beyond the success of last January. Not only will some of the best men in the field contribute papers setting forth results of careful work which they have done in an effort to better their own plants and businesses, but every man who can add an item of knowledge to the record is called upon to do it. Each telephone man who plans to attend the convention is asked, by those in charge of the program, to put on paper all he knows about certain subjects,—such as depreciation of various classes of telephone property ,and the proper method of providing for it in the financial arrangements; cable crystallization; insurance; improving collections; pole preservation; increasing toll traffic; and so on.

If each will realize that it is not the experience of a few, but the summary of the experiences of many which makes a conference bring results which are big, and valuable, and safe, there will be no difficulty in getting enough men to put in some good solid work, and make the plan a great success at its first trial.

We hope that every man who attends will do his part. Those who start now to get their ideas on paper and send them in to Mr. Johnston within the next ten days, will be

sure of avoiding the suspicion that they come to the convention as onlookers, and not as participants. At a meeting where a man is able to get so much helpful information from others, he at least owes the duty of contributing his experience on two or three of the topics which will be discussed.

Forest Protection by Telephone.

Gifford Pinchot, Forester of the United States, was recently interviewed by the newspapers on the subject of the disastrous fires which have caused the loss of so much valuable timber within the past few weeks. He said that what we need most is the improvement of methods for preventing the starting of fires. Rangers must patrol the forests, to detect a smoke at the earliest possible moment after the kindling of the fire, and these patrols must have at their command the means of bringing all necessary assistance to fight the flames in a minimum time.

Perhaps it was an oversight that attention was not called to the very considerable amount of valuable work which has already been done by the Forest Service, not only in establishing patrols, but in furnishing them with the facilities for doing their work most effectively. And, if the most essential thing is for the ranger to discover the fire at its inception, we find that the telephone occupies the place of second importance in that it provides a means for summoning assistance promptly.

There are now built, or in process of construction, some hundreds of miles of telephone lines connecting stations in our great national forest reserves. Not only has the Forest Service spent funds from its own appropriation in developing this wilderness telephone system, but it has at every opportunity secured the co-operation of companies already owning lines approaching the borders of the reserves. And these lines not merely serve to summon aid for the protection of the timber, but also, in times of illness or other danger, are used to send out calls for help from the lonely cabins of settlers in the little clearings far removed from towns. This is a class of telephone service which under conditions prevailing up to the last few years would never have been established. It is not directly a revenue provider, but there are times when the ability to send a single message over one of these lines is worth many times the cost of the equipment.

Independent Toll Contracts Not Monopolistic.

Contracts for toll connection between Independent exchanges which provide that the contracting parties shall not compete with each other in specified districts cannot be broken down in court by the Bell company on the ground that they are in restraint of trade and tend to promote a monopoly.

The State of New York now has added the confirmatory judgment of a justice of its Supreme Court to the opinions laid down recently by Ohio judges bearing upon the right of an Independent telephone company to make contracts whereby it may enjoy toll connection with an associate which shall be exclusive within certain limits prescribed in the agreement.

In proceedings relative to a demurrer filed in the case of the Wayne-Monroe Telephone Company vs. Ontario Telephone Company and Empire State Telephone & Telegraph Company, the defendant Bell companies, in a demurrer, urged, as the Ohio Bell company had done, that the contract in question, on account of certain features therein contained, is invalid because in restraint of trade and tending to promote a monopoly. Justice Sutherland, however, in his opinion just handed down, takes a broad view of the situation, recognizing the general conditions prevailing in the telephone field. He stated his view that, since, instead of creating monopoly, a new long-distance telephone system was instituted by the connection of two separated local systems, thereby according the public the benefit to be derived from competition in long-distance business, the contract would appear primarily to be not for the purpose of restraining trade, but for its extension, and for the public welfare and convenience; and it was principally upon this ground that he overruled the Bell demurrers.

This case is one which, upon further adjudication, may prove to have a considerable bearing upon the broad problems affecting the integrity of the Independent telephone system, and will be watched with much interest. The decision already handed down promises to be of considerable value, in connection with those recently set forth in Ohio, as an aid to the discouragement of efforts to break down the relations of the smaller Independent companies with their associates.

Practical Efficiency Standards.

So-called standardization of the form of telephone apparatus is generally recognized as undesirable, not only because it is impossible to conceive that any committee of men in the field would be able to formulate rules which would determine a wholly fair and satisfactory standard, but because, even if they could do so, the result would not be beneficial. The issuance of any rules relating to even minor details would tend to restrict the range of development, and limit the rate of progress. An instance which may be cited to illustrate this aspect of the standardization proposition is the change in the prevailing belief in the necessity for rubbing contacts were considered to be essential in all apparatus. As experience in the use of platinum points grew, sentiment changed, and now the rubbing contact is a comparative rarity in modern telephone appliances. Operating men and manufacturers can furnish dozens of other examples, all leading an observer to the same conclusion. But this does not mean that there is not great need of some standardization.

The idea of having, perhaps, not a standard of efficiency, but a standard, easily applicable method of determining efficiency for each class of apparatus, is, however, something well worth working on. Mr. Deakin's letter on another page expresses views with the general trend of which managers, and engineers connected not only with the operating companies, but with all manufacturing companies making high grade apparatus, will be in sympathy. Much benefit could come from a free discussion of this topic. It is an appropriate subject for consideration at the coming convention and, at any time, TELEPHONY will welcome an opoprtunity to put before its readers any well-considered expressions of opinion upon this subject which may be addressed to this journal.

English Practice in Overhead Construction

By N. D. Blagdon-Phillips

To a telephone man who is accustomed to cities where aerial work is non-existent, the amount of overhead telephone construction in London will be very noticeable. In this city one sometimes finds quite dense masses of wires and cables, particularly where these converge on an exchange.

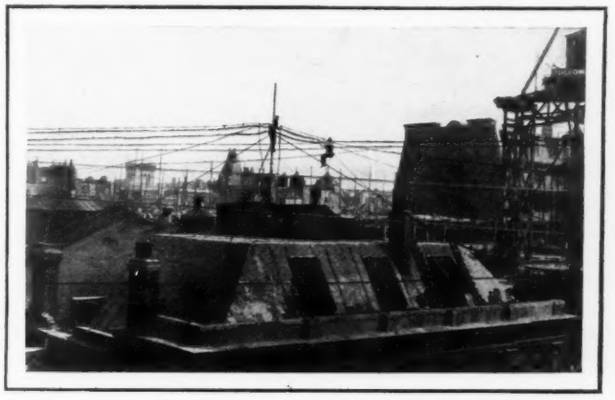
A London exchange has on its roof a "derrick" accommodating lines for some thousands of subscribers. This being the case, it becomes necessary, both on account of cost and space, to pack the lines into cables as far as possible. The cables for this class of work are principally 26 pairs or 52 pairs.

Office blocks, over which the routes run, are 5 or 6 stories high, and poles are erected on suitable buildings, making spans of about 100 yards. The poles consist of iron pipe, ranging in length from 15 to 41 feet, and in diameter from 3½ to 4½ inches, being securely guyed with either 7 strands of No. 11 gauge galvanized iron, or 5 strands of No. 8.

Communication is established between poles by men going on intervening roofs and dropping cords down on the street, where an assistant then ties the ends together. A messenger of No. 10 gauge galvanized steel wire is now hauled across, together with a continuation of the cord; this last being, of course, for the purpose of hauling subsequent wires. Two messengers are used for a 26-pair cable, and three for larger ones.

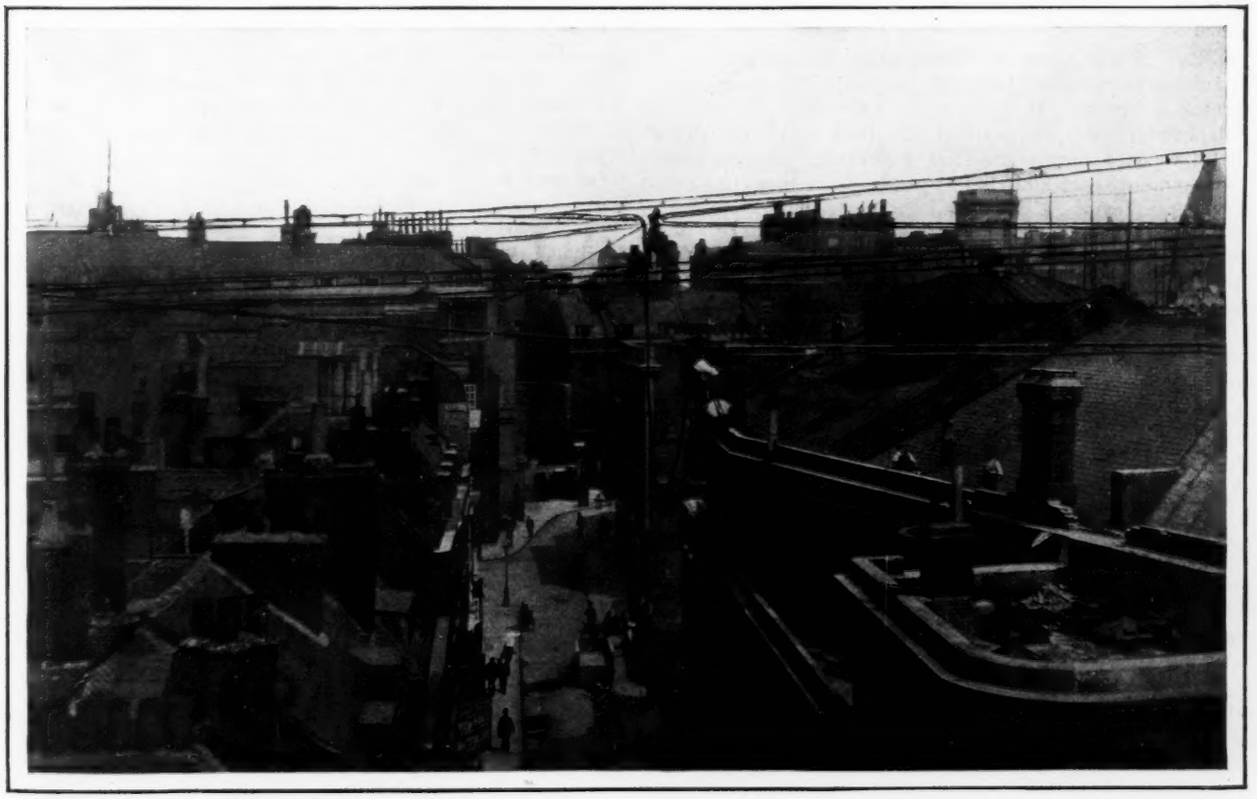
Each messenger or "suspended," as it is called in London, is wound taut by a ratchet and made fast to the pole, one wire immediately above the other and all in intimate contact throughout their length, then bound together for a few inches at each end; thus insuring that each shall bear a strain equal to that put upon its mates. The end of the cable is now held in a vice, on which is a pulley wheel running on the messengers, and hauled into position.

It now becomes necessary for a lineman to traverse the whole span for the purpose of placing the cable hangers or slings. These slings are composed of rawhide attached to a loop of wire in the form of an open split-ring, and these are placed at intervals of three feet.



Transferring Aerial Cable from One Span to Another in London.

The hide grips the cable tightly, and the wire loop hangs



Linemen at Work on Aerial Cable Leads Above the Streets of London, England

freely on the messenger. This last provision is necessary in view of a cable later on having to be pulled along for any reason.

The accompanying photographs of the linemen at work, over the streets and buildings in London show clearly what is being done. Owing to the demolition of the Imperial Theatre and the consequent removal of a pole from its roof, the cables are being removed from two of the spans to a third span.

The men are seen seated in "bosun's chairs," which are

Cablemen Using the "Bosun's Chairs" Above the House Tops in London

hung from pulleys running along the messenger wires, and their assistants, stationed at the respective poles, pull them along as they adjust the slings.

When this particular piece of work was accomplished there were some seven yards of cable over, owing, of course, to the one span being that amount shorter than the sum of the other two. This residue could then be dealt with, as already explained, by being hauled along to poles further along the route.

Plant Costs in Competitive Territory.

In localities where the Bell company is endeavoring to arouse a sentiment in favor of the unification of competing telephone plants, much stress has been laid upon the alleged waste arising from plant duplication. It is a matter of common belief among Independent telephone men that such arguments are not supported by fact and experience; but are put forth largely because those advancing them, feeling a necessity to give some excuse for unprofitable operation, use the one which they think will sound best and most plausible to a poorly informed audience.

An attempt to bring out the actual facts bearing upon such a situation, which is being made by Mr. G. R. Johnston, general manager of the Columbus Citizens' Telephone Company, is particularly interesting. The following is his statement, which is, as he says, "offered for criticism," in the October issue of the Bulletin of the Ohio Independent Telephone Association.

"The accompany statement shows the comparative cost of telephone construction to reach subscribers in certain assumed typical cases by one system and by two systems, with the percentage of excess cost involved in the latter case. The other is designed to show the effect of combining two competing telephone plants into one plant serving the subscribers of both. If the figures and assumptions are correct and the instances typical, they establish these facts—that the excess cost of building two telephone plants instead of one is rather under than over twenty per cent, with fifteen per cent of duplicate subscribers; and that two competing telephone plants can perform their separate service and make a profit at lower rates than it would be necessary to make the same profit from a combination of the two.

Some of those who have seen these figures have said that they contain fallacies, but none have gone far enough to show wherein these fallacies consist. The writer is desirous of getting at all the facts that might bear upon these questions and would be thankful for any verifying or opposing figures which may be furnished him. He has only to request that any words which may be offered in criticism be worked out into figures by the composer before their conclusion is guessed at. For example, before any correspondent suggests that the percentage of duplication is high, if the cable is only half full, or high on competing magneto exchanges with no more than one line on a road, he is asked to have his costs worked out on that basis.

Adding a proportion of the lower table to the middle table on the opposite page, the general statement shows as follows:

	One System.	Two Systems.
Two-mile stretch, with complete connections..	$17,655.20	$20,963.60
Portion of one mile of subway—		
200/1800 of 78,545.30.....	8,727.20	.....
200/1800 of 86,465.30.....	.....	9,607.20
One-mile stretch of open wire.....	556.80	748.80
	$26,939.20	$31,319.60

Excess cost of two systems, $4,380.40, or 16.3%.

On this run of connections, if there should be 15% of duplicate subscribers, the duplicated investment to reach them is represented by the 15% of particular duplication, plus 15% of the general ratio of extra cost, or of 16.3%, or 2.4%, making 17.4% duplicated nvestment on account of the duplicated subscribers.

In applying these examples to the general consideration of the subject of telephone duplication other matters may be taken into account, as well as allowance made for the great variety of conditions in different places; but it is though the situation represented by the second statement is fairly typical of city conditions.

The duplication which appeals to the imagination is more apparent than real, and so far as it is real it is in the less costly portions of the plant. The individual portions include the cable conductors, cable terminal connections, fuses and wire, crossarms (in units of five circuits), line wire, drops, fuses and fastenings, telephones, interior wiring, and a large part of the central office equipment. Among those portions which do not increase in proportion to the increased size of the plant, are the poles, part of the cable sheath, messenger and hangers, cable terminal cans, pole seats, part of the pothead, part of the central office equipment and of the building. Certain expensive parts of the central office equipment and its building space increase in cost in greater ratio than the increase in the number of lines.

Among considerations which might lead to a greater ratio of excess cost in the separation of systems are:

Poor engineering on the two systems;

Construction greatly in excess of demand;

Extremely scattered distribution;

Enforced subway construction in regions of light business;

Any incomplete use of facilities.

The considerations leading to a lower ratio of excess cost in the separation of systems, include:

Better engineering on the other system than on the one assumed to be the single desirable system;

Concentration of lines (as in business districts);

Use of facilities to their economical capacity (including lease of unused subway or pole or building space to others);

Overloading of facilities of either company (making duplication necessary in any event);

	Single Line			Two Lines		
	Quantity.	Unit Price.	Cost.	Quantity.	Unit Price.	Cost.
Poles, 35-ft., cedar	40	$7.00	$280.00	80	$7.00	$560.00
Hauling and setting	40	3.50	140.00	80	3.50	280.00
Guying	....	....	40.00	....	....	80.00
Cable—						
200 pair	880′	73	642.40	....	....	.....
175 "	440′	68	299.20	....	....	.....
150 "	880′	55	484.00	....	....	.....
125 "	440′	49	215.60	....	....	.....
100 "	880′	42	369.60	2640′	42	1108.80
75 "	440	32	140.80	2640′	32	844.80
50 "	880′	23	202.40	2640′	23	607.20
25 "	440′	16	70.40	2640′	16	422.40
Splicing	....	....	50.00	....	....	100.00
Messengers, hangers and labor placing cable	5280′	05	264.00	10,560′	05	528.00
Terminals—						
20 pr., can top, with fuses	12	11.00	132.00	*24	6.00	144.00
Potheads and labor	12	5.00	60.00	24	3.00	72.00
Pole seat in place	12	1.50	18.00	24	1.50	36.00
Bridle wire in place	12	2.50	30.00	24	1.50	36.00
6 extra crossarms	12	4.80	57.60	†24	2.40	57.60
Crossarms complete	80	.80	64.00	80	.80	64.00
Line wire (average 150 feet)	200	1.60	320.00	200	1.60	320.00
Labor	200	.25	50.00	200	.25	50.00
Drops (average 150 feet)	200	2.25	450.00	200	2.25	450.00
Labor	200	.75	150.00	200	.75	150.00
Fuses and fastenings	200	.16	32.00	200	.16	32.00
Telephones	200	7.50	1500.00	200	7.50	1500.00
Interior wiring and labor	200	1.50	300.00	200	1.50	300.00
Central office equipment in 9600-line board	200	23.00	4600.00	‡200	17.50	3500.00
Building ($96,00)	200	10.00	2000.00	$200	15.00	3000.00
			$12,962.00			$14,242.80
Add 10%			1,296.00			1,424.20
			$14,258.00			$15,667.00

*10-pair. †3 extra crossarms. ‡In 4800-line board. $$72,000.
Excess cost of two lines over one=$1409, or 10.1%.

Statement Comparing Cost of Telephone Construction to Reach 200 Subscribers, Within One Mile (of Twelve Blocks Each) on One System, and on Two Systems.

	Single Line			Two Lines		
	Quantity.	Unit Price.	Cost.	Quantity.	Unit Price.	Cost.
Poles	80	$7.00	$560.00	160	$7.00	$1,120.00
Hauling and setting	80	3.50	280.00	160	3.50	560.00
Guying	....	....	80.00	....	....	160.00
Cable—						
200 pair	1320′	.73	953.00	....	....	.....
175 "	1320′	.63	897.60	....	....	.....
150 "	1320′	.55	726.00	....	....	.....
125 "	1320′	.49	646.80	....	....	.....
100 "	1320′	.42	554.40	5280′	....	2 217.60
75 "	1320′	.32	422.40	5280′	....	1,689.60
50 "	1320′	.23	303.60	5280′	....	1,214.40
25 "	1320′	.16	211.20	5280′	....	844.80
Splicing	....	....	75.00	....	....	150.00
Messengers, hangers and labor placing cable	10560′	.05	528.00	21,120′	.05	1,056.00
Terminals—						
Can top	24	6.00	144.00	48	6.00	288.00
Potheads and labor	24	3.00	72.00	48	3.00	144.00
Pole seat in place	24	1.50	36.00	48	1.50	72.00
Bridle wire in place	24	1.50	36.00	48	1.50	72.00
3 extra crossarms	24	2.40	37.60	*48	.80	38.40
Crossarms complete	80	.80	64.00	160	.80	128.00
Line wire (average 150 feet)	200	1.60	320.00	200	1.60	320.00
Labor	200	.25	50.00	200	.25	50.00
Drops (average 150 feet)	200	2.25	450.00	200	2.25	450.00
Labor	200	.75	150.00	200	.75	150.00
Fuses and fastenings	200	.16	32.00	200	.16	32.00
Telephones	200	7.50	1500.00	200	7.50	1,500.00
Interior wiring and labor	200	1.50	300.00	200	1.50	300.00
Central office equipment in 9600-line board	200	23.00	4600.00	200	17.50	3,500.00
Building ($96,00)	200	10.00	2000.00	†200	15.00	3,000.00
			$16,050.20			$19,056.80
Add 10%			1,605.00			1,905.60
			$17,655.20			$20,962.40

Excess of two lines over one=$3307.20, or 18.7%.
*1 extra arm. †$72,000.

Statement Comparing Cost of Telephone Construction to Reach 200 Subscribers, Within One Mile (of Twelve Blocks Each) on One System, and on Two Systems.

As further suppositions, let the cable reach the beginning of the pole line through a mile of subway, having, say, eight ducts conveying six 300-pair cables; and let eight subscribers be reached by open copper wire lines of one mile on 30-foot cedar poles.

An 8-duct subway under brick or Belgian block grouted is figured by the H. B. Cramp Company to cost on the average $2.05 per foot; with 16-duct, $2.85.

One system.		Two systems.	
5280′ subway at $2.80	$15,048.00	10,560′ subway at $2.05	$21,648.00
12 manholes at $50	600.00	24 manholes at $50	1,200.00
5280′ 300-pr. cable (88x12)	55,756.80	5,280′ 300-pr. cable (88x12)	55,756.80
	$71,404.80		$78,604.80
Add 10%	7,140.50	Add 10%	7,860.50
	$78,545.30		$86,465.30

Excess cost of two systems over one, $7,920, or 10.1%.

Eight copper circuits on poles, one mile, poles and lines only.

	One Line.	Two Lines.
30′ 6″ cedar poles at $2.40	(40) $96.00	(80) $192.00
Hauling and setting at $2.40	96.00	192.00
80 crossarms complete at 80 cents	64.00	64.00
8 circuits copper wire, 16 miles, 105 lbs. to mile, at, per lb., 16 cents	268.80	268.80
Stringing wire, per circuit mile, $4.00	22.00	32.00
	$556.80	$748.80

Excess cost of two lines, $192, or 34.5%.

The approach on either plant to that size of equipment, or material, beyond which there is no economy in enlargement.

In their bearing in the effects of time, we have these considerations:

The history of the business has been the building for a smaller development than has offered;

Joint use of poles as between others than the competing telephone companies has been common;

The price of poles has been advancing, so that the carrying of poles in the ground, with a light load, is not so costly as it might appear in comparison with a smaller number, with a heavier load, and consequent shorter life;

The separate plants are better adapted to care for the growth still to come:

The separation of plants has led to more experimenting and earlier adoption of improvements.

HYPOTHETICAL COMBINATION OF TWO TELEPHONE PLANTS OPERATING IN A GIVEN CITY, EACH WITH A SWITCHBOARD OF 4,800 LINES IN USE.

One plant is assumed to have none but individual lines, the other, a preponderance of two-party lines. Their respective capitalization is as follows:

Five per cent bonds	$300,000	$ 300,000
Six per cent preferred stock	300,000	350,000
Common stock	300,000	350,000
Totals	$900,000	$1,000,000

The bonds and preferred stock represent the actual plant cost. The common stock in each case has borne the cost of original organization, of obtaining franchises, of the brokerage and risk-discount on the bonds and preferred stock and of interest and dividends thereon prior to their payment from the revenues of the plant, of the original canvass for business, and of all other items of cost above the actual labor and material put into the plant itself. On this common stock it is assumed that two per cent dividends are paid. The statements of the two companies show approximately as follows:

1. EARNINGS.

2000 business telephones at $40	$80,000.00		
2700 residence telephones at $24	64,800.00		
100 idle, company, pay station, toll-board and other non-rental lines			
500 extensions at $12	6,000.00		
Tolls	3,000.00		
Total earnings			$153,800.00
EXPENSES.			
Operation	$31,000.00		
Maintenance	31,000.00		
General	13,000.00	$75,000.00	
Taxes (5% of earnings)		7,690.00	82,690.00
Net earnings			$71,110.00
Bond interest	$15,000.00		
Preferred stock dividends	18,000.00		
Common stock dividends	6,000.00		39,000.00
			$32,110.00
Reserve and depreciation (4% of $600,000)			24,000.00
Surplus			$8,110.00

2. EARNINGS.

1000 main lines, business, at $40	$40,000.00		
500 party business line, one on line, at $32	16,000.00		
500 party business lines, two on line, at $64	32,000.00		
800 main lines, residence, at $24	19,200.00		
900 party residence lines, one on line, at $18	16,200.00		
1000 residence party lines, two on line, at $36	36,000.00		
300 extensions, at $9	2,700.00		
Tolls	2,500.00		
Total earnings			$164,600.00
EXPENSES.			
Operation	$32,500.00		
Maintenance	32,500.00		
General	13,500.00		
		$78,500.00	
Taxes (5% of earnings)		8,230.00	86,730.00
Net earnings			$77,870.00
Bond interest	$15,000.00		
Preferred stock dividends	21,000.00		
Common stock dividends	7,000.00		43,000.00
			$34,870.00
Reserve and depreciation (4% of $650,000)			26,000.00
Surplus			$8,870.00

It is proposed to combine these two plants. The advertised motive is the unification of the service so that every telephone subscriber can get connection with every other and so that the duplication made necessary by the divided systems can be saved to the public. It is assumed that the motive that will actuate the owners of the companies is to be looked for in profits to themselves from promotion of the combination or in larger profits from the operation.

It will be observed that out of the $153,800 earnings of the first plant there is spent upon maintenance and interest $64,000, or more than 40%. After allowing for depreciation and the large proportion of the taxes which is assessed against the property value, the total annual expenditure on account of the property, independently of the operating and administration expenses, runs more than 60% of the annual revenue. This property is almost altogether in fixed forms, so that in the combination of the two plants it would be more economical to adapt the operation to the plants than the plants to the operation. In bringing the plants into combination, the furnishing of complete exchange service would be accomplished by trunking connection between the two exchanges and trunking switchboards at these exchanges. A subscriber on the first plant calling for one on the second would need two operators, known respectively as A and B operators, to handle his call. This would be the same as though the subscribers lines terminated in different branch offices on the same system.

The cost of the two new trunking B switchboards, additions to the A switchboard, and connecting cable, may be estimated at $60.000.

Additional operating cost:

Increase in A operators' switchboard positions from 82 to 106	24
Increase in B operators' switchboard positions from 0 to 16	16
Total increase of operating 40 switchboard positions	40
Cost of operating 40 switchboard positions, allowing for day, evening, night and Sunday operators, supervision and care	$22,000
Cost of maintenance of additional equipment	2,000
Cost of insurance of additional equipment	300
Additional interest on the two plants, 5 per cent of $60,000	3,000
Additional taxes	500
Cost of 4 per cent depreciation on $60,000	2,400
Total additions to annual expenditures	$30,200

Rent, heat, light, janitor service, etc., assumed to be offset by savings in general office space.

In general expenses savings could be made (though their advisability is questionable) by dismissal of sundry officers, manager, cashier, contract agent and engineer; but not (unless in small part) their clerks, collectors and solicitors.

The saving would be, say	$ 8,000
In maintenance expenses possibly three department heads could be displaced by cheaper men, saving	1,500
Total annual saving	$ 9,500

On the above basis the statement of the combined company would appear as follows:

Earnings		$318,400
Expenses and taxes—		
Operation	$85,500	
Maintenance	64,000	
General	18,800	
Taxes	16,420	
		184,720
		$133,680
Bond interest	$33,000	
Preferred dividends	39,000	
Common dividends	13,000	
		85,000
		$ 48,680

4 per cent reserve and depreciation on $1,310,000.	52,400
Deficit	$ 3,720

To restore the surplus to its original amount of $16,980, would require an addition of $20,700, or an average of $2.15 per year for each main line.

Suppose there are 700 (600 business and 100 residence) telephone users in the city having telephones on both systems. This is equivalent to duplicating 14.9% of the working lines of each system. Their payments under competing plants would amount to $26,400 a year, for which they would get all the benefits of two lines, among which are the simultaneous use of both and the alternative use in event of interruption on one, which two considerations alone would lead to the retention of a considerable portion of the 700. An additional charge of $2.15 per line (if assessed indiscriminately) would pay 78% of this amount, so that if so few as 22% of the dual telephone users (or 154 out of 10,200 individual subscribers, being 1.4%—an inadmissable supposition) should retain two telephones, the saving of the remainder would no more than equal the general advance in rates. If rates were to be raised $3.00 per line per year, then the cost to the public would be greater than under the separate system. This disposes of the alleged savings from avoidance of duplicate subscriptions.

It might be said that the increased service would be worth more than this cost. But there would be no prospect of the public's getting the increased advantage at so low a price. Increased profits from operation sufficient to tempt the owners of the plants to combine could only come from the expectation of exercising the monopoly power to increase telephone rates on an average of not less than six dollars a year per line, or $57,600 per year for the two systems; or it might be advances of three dollars for each residence subscriber on main or party lines, six dollars for each party-line business subscriber, and nine dollars for each main-line business subscriber. This would yield $55,200 a year additional.

On the assumption that 14.9% of the lines are duplicated by subscription from the same individuals to service on both plants, this means that 6.4% of the individuals subscribing for telephone service are willing to pay 100% additional for the benefit of unified service, plus the other benefits. Some fraction of this small percentage is willing to pay 100% additional for the unification alone. There is no warrant in this for believing that the other ninety-four or ninety-six or ninety-eight per cent of the subscribers would be willing to pay 12.5 to 22.5% additional either for the unification of the service or to permit the others to save themselves 39% of their telephone rental.

In using these illustrative figures, the writer has attempted to select those that would be typical for prosperous companies, so as to display hypothetically what actual figures have shown in sundry cases wherein consolidation of competing telephone plants has been contemplated; namely, that the business is not such a one that there is any essential economy in giving additional values. More service costs more money. Competing service gives more gradations from which the user can choose.

Various additional considerations might be advanced The figures selected show plants whose lines are well distributed according to the demand, but unless they were perfectly distributed this condition is an index of an unfilled demand even though the pressure for service is not supposed to be sufficiently great to fill all the party-lines. There is nothing in the combination illustrated that would permit the taking on of waiting applicants except as lines might be relieved by cancellations. If one of the companies could be conceived as unprosperous by reason of failing to obtain its share of the business or by reason of excessive expenditure, then there might be a motive for that company to sacrifice in a sale to the prosperous company. No account is taken above of the loss of revenue from present subscribers unwilling to pay the advanced rates or the cost of replacing these with new subscribers. The plants might have more flexibility than is attibuted to them. The switchboards might be sufficiently worn to be ready for replacement and a new switchboard installed in a single locality instead of continuing the divided boards, at some, but not a great, saving. There might be some parallel pole lines carrying less than a full load of which, after transferring to the one, the combination could dispose of the other. However, it is not thought that these considerations, and others not mentioned, would change the conclusion that the proposed consolidation would not pay.

So far nothing has been said about the public benefits from the competition. These benefits alone, in many minds, are sufficient to warrant the payments of some otherwise unnecessary costs. As applied to the telephone service, these benefits may be divided into those that result from seeking public favor and those which result from the endeavor to reduce costs. The first are manifested in lower rates, better service, better manners, and a more prompt response to the demand for additional facilities. The desire to reduce costs, which ultimately, under competition, redounds to the benefit of the public, is manifested in better management and more rapid progress and application of invention.

Three Greatest Benefits of Former Meetings.*

By J. A. Gustafson.

It is presumed that this paper is to cover the points of mutual benefits both to company and employees.

At our first meeting our thoughts were centered on profits as the goal of our efforts and investments. Business as carried on by a large firm or corporation is different from that of a small firm, in that the owner or principal shareholder is not on the ground floor, where the real work is being done.

The stockholders of a corporation are, as a rule, men occupied with other duties, entrusting their business to employes. This being the case with our employers, it is for us to make the business a success.

Profits are not alone brought about by increasing the income, for, as a rule, when the income has been increased the investment has likewise been increased. Look out for the leaks and stop them, as every leak plugged up is clear profit.

In order to build up a business of profit that will last, we must make it profitable to our patrons by furnishing the best possible service at the least possible cost. To gain this result, and pay dividends to our investors, with profitable salaries to employes, means the utmost efforts of all concerned.

A second point that was most forcibly emphasized was the fact that "anything less than our best is a crime."

The third, and one of the most beneficial, accomplishments of our former meetings was organization—forming a unit in our system of work. As Mr. Shoemaker said, "We must keep step, and to do this we must step alike."

There are other very helpful results gained by these meetings, such as pushing the collections, clearing out unprofitable business, etc. To sum all up we find that we must do our best to make the business a profit to patrons, employes and investors.

*Abstract of a paper presented at the meeting of Corn Belt Telephone Company Workers, Waterloo, Iowa, October 15.

Some Construction Pointers

By B. A. Deen

Where a short lead of poles branches out from the main lead to take care of local distribution, as on some side street, it is often left without any end supports, or guys. The construction man is prone to take it for granted that, as there are only a few wires on the line, the poles themselves will hold all the strain, or that a little sag in half a dozen wires does not matter.

As a matter of fact, however, it does matter a great deal more than he thinks, for it is on such leads as these

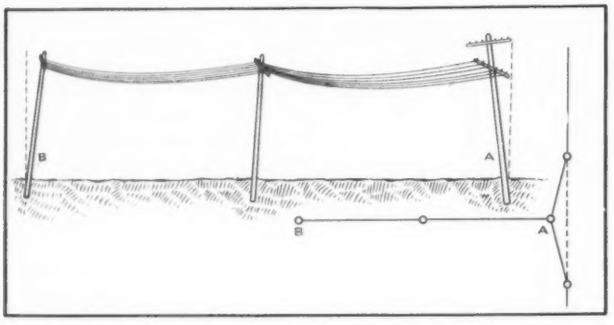


Fig. 1—Absence of Proper End Guys Causes Sagging Poles and Slack Wires.

that the most trouble occurs and on which the cost of maintenance is relatively high, on account of slack wires and the troubles incident to them. Although a slack wire will give precisely as good service as a tight one as long as it is clear, yet the trouble account on a slack wire line, from crosses, is much greater than one in which the wires are so tightly drawn that they cannot touch one another, or, if they do touch, are so taut that they cannot cling together.

This slack comes from the yielding or bending of the end poles. The tension causes both a yielding at the ground line, and the bending of the pole itself. It should be borne in mind that a variation in position of one inch at the ground line means a variation of from 5 to 8 times as much at the top of the pole. Even if one supposes the pole to be so firmly set that the ground cannot yield, there is the bending of the pole itself, which may in many instances, be several inches at the top. This bending may not be appreciated at the time the strain is first put upon the pole, but with poor balancing of loads and supports the bend will increase as time goes on, and throw slack into the whole lead as well as put additional strains upon the arms, pins and insulators of the poles behind the one which first gets out of position.

In Fig. 1 is shown, in exaggerated detail, the effect upon the poles of leaving them without supports of any kind, the poles out of line being not only the end pole, *B*, but the main line pole, *A*. While the deflection of the pole *B* will affect other poles but little, the deflection of the pole *A* will be likely to cause other poles on the main line to lean in the same direction, particularly during rainy weather, when the ground is soft. It is not as unusual as it should be to find long leads leaning from 1 to 3 ft. toward the middle of the street; and all because some branch leads have not been properly guyed, so that one pole, leaning out of line, has pulled all the rest over.

Guys or braces should be taken from just above or just below the cross arm, or part of the pole on which the strain comes, for, if the guy or brace be placed 5 ft. below the arm, the bending of the pole is very noticeable even when no more than 2 or 3 pairs of wires are pulling against it.

Fig. 2 shows the well known method by which a branch lead can be held in position and the wires drawn as taut as may be desired. The trick is very simple; with anchors behind the poles *A*, *B*, there is no yielding anywhere.

Of course wires must not be so taut as to break when cold weather comes on, but with a sag, in a 150 ft. span, of six inches in cold or one foot in hot weather, there is no danger.

House wires are an exception to the rule to leave wires taut. The house drops should not be pulled tight for the reason that they not only tend to pull the pole out of line, but their humming is disagreeable to the occupants of the house, while the swaying of the pole line by the wind tends to loosen the insulators or even pull the arms out of position. If open wiring is used, both wires should be covered with durable insulation. If "duplex" wire is used, as it is in a great many of our larger plants, it follows, as a matter of course, that it cannot be very taut or there will soon be trouble.

SETTING ANCHORS.

Anchors, even on light branch lines, should be set with the expectation that they may some time have to carry a much heavier load than appears likely in the immediate future. Branch leads sometimes become part of a new main line, and even country lines may come to carry two or three arms. Where patent anchors which can be put down or taken up at any time, are used, this statement does not apply, as they can be easily changed; but where the average wood block and rod anchor are used, the cost of the block is as nothing compared to the cost of digging the hole, and it should therefore be large enough and strong enough to hold the strain of four arms at least, with a considerable safety factor. It costs but a trifle more to dig a five-foot hole than it does to dig one four feet deep, and, unless the digging is very hard, a depth six feet is still better. This places the anchor below the action of frost and other surface disturbances, while its holding power increases in far greater ratio than the depth.

The statements as to depth, however, do not apply to anchors set in solid rock and cement or lead as shown

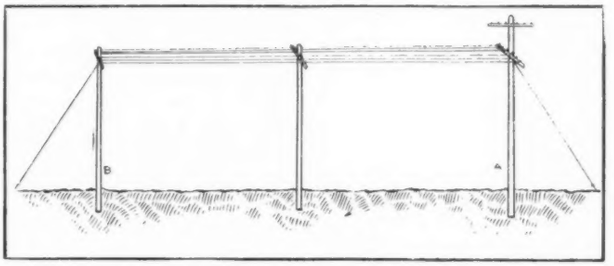


Fig. 2—Branch Lead, Properly Guyed, on Which Risk of Trouble Is Reduced to a Minimum.

in Fig. 4, diagram *F*, which is the best anchor obtainable. The following is an idea which the writer believes to be a practical money saver:

In the first place it is necessary to have a quantity of cement, broken stone, or gravel, and some sand on hand, or readily obtainable. All that is then required is to dig a

vertical hole the proper depth, with a trench to allow the rod to slant, put in an anchor, or a rod with a nut and a large washer on the bottom, and fill the hole half full of concrete, composed of a mixture of 1 part cement, 3 parts sand, 4 parts broken stone or gravel, and let it set for several days before using. (Fig. 3.) If a post auger is obtainable, the hole may be dug slanting, as shown in the right hand diagram. Wet the sides of the hole before putting in the concrete and tamp the concrete well. While patent anchors are now very economical and convenient for use, a thoroughly satisfactory old stand-by is a half of a sawed railroad tie, as shown in Fig. 4-*A*, which will hold all that a ¾ inch rod will stand, provided the tie is sound. Fig. 4-*B* shows a split log which is just about as good. Where a round log is used it should be set a little deeper, as a round surface yields more readily than a flat one.

For light guying, planks, 24″x12″x3″, may be grouped as shown in Fig. 4-*C* or crossed as in Fig. 4-*D*. Sometimes it is necessary to place a slug "endwise," as shown in Fig. 4-*E*, in which case there might be a slight tendency toward drifting horizontally. To provide against this, a plank about 3 ft. long may be set upright against the end and well tamped. A slug placed in this position is as effective, and will hold as much, as if set transversely.

Anchors for poles supporting cable should be heavier than for open wire work. A full length railroad tie is often used, and usually holds more than one anchor rod. Such a "dead man" is set from 8 to 10 ft. below the surface, and may well be covered to a depth of from 6 to 12 in. with concrete. When concrete is used the holding surface is that of the tie surface, plus the surface and weight of the concrete, which also beds it firmly into the side walls of the excavation.

TAMPING WITH WATER.

Baling water out of a hole is dirty work, which also wastes considerable time, and the use of water is never resorted to by the writer except to dig the hole deeper or clear out some obstruction. But, in clay soils, water in a hole is an advantage rather than otherwise, as it saves a great deal of tamping. If there is much water standing in the hole, as is likely to be the case in some sections of the South, and when the hole is of the proper depth and clear of obstructions, all that is necessary is to throw the pole in, straighten up and throw in the dirt, tamping it a little in order to settle it to the bottom more quickly and break up the lumps; this will force the water out, over the top, and, though the dirt may be soft, the hole will be about as dry as could be expected; the water will either dry out or be absorbed by the surrounding soil and the

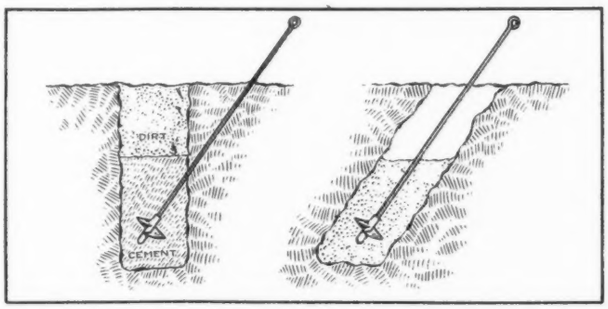


Fig. 3—Cement Settings for Guy Anchors.

pole will be as firmly planted as possible under existing conditions. It has been found that poles or anchor slugs set in water are the best tamped of any, especially when allowed to settle a day or so before any strain is put upon them, because water dissolves the lumps, and the dirt all settles down leaving no air spaces.

Fill a slug hole nearly full with dry dirt tamped by the ordinary methods; then pour a few buckets of water into it and watch the dirt settle. This is the answer to doubters!

Where the dirt is dry, the slug should be covered with a foot of dirt puddled with the tamper. This will settle the dirt around the slug firmly in corners that the tamper

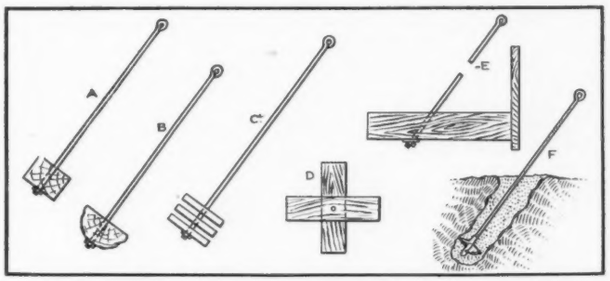


Fig. 4—Various Types of Anchors for Holding Guy Wires.

cannot reach, an especial advantage of this method.

In setting a pole the dirt should be about half filled in, and then settled with the tamper and one or two buckets of water. The amount of water used may depend upon the convenience of obtaining it, but two buckets for a pole, or from 4 to 6 for a 4 ft. slug, will be a minimum amount.

If the minimum amount is used a strain can usually be put upon the anchor within one hour of the time of setting and the anchors will show no sign of yielding; in fact, where the guy has been drawn a little tighter and the pole raked back with that expectation, the result has been slightly disappointing for the anchor refused to let the pole straighten up.

The probable explanation of the action is as follows: water, does not cause ordinary soil to expand or swell, it merely settles between the minute grains of sand, of which nearly all soils are composed. In clay soils these particles of sand have a tendency to cement together, and are separated by water. This does not apply to vegetable mould found in top soils, which should never be thrown back into the hole if there is plenty of other dirt. This mould absorbs water, and will often float. When, therefore, a hole is filled half full of water and clay or other dirt thrown in, it will sink to the bottom, and, with a little tamping to break up the lumps and air chambers, will force nearly all the water to the top. When the amount of water has decreased enough, the particles stick to each other, as well as the surrounding walls, and set together more closely than they could be made to do by the ordinary dry-tamping process.

Trimming Trees in Mississippi.

An action was brought against the Cumberland Telephone and Telegraph Company for the statutory penalties for cutting trees in Mississippi. When the plaintiff acquired the property, the telephone wire was running along the side of the road over some of the land, and had been there located for seven years. Before this action no complaint was ever made against the company for cutting the undergrowth which interfered with their wire. The Lee County Circuit Court gave a judgment for the plaintiff, but this was reversed by the Supreme Court of the state which held that a strict construction should be given against this highly penal statute. The court held that the cutting by the company, being done under a manifest idea of right, did not constitute a willful and malicious cutting under the statute.

Cumberland Telephone & Telegraph Company vs. Martin, 46 So., 247.

Side Profits in Charging Automobile Ignition Batteries

By W. T. Powell

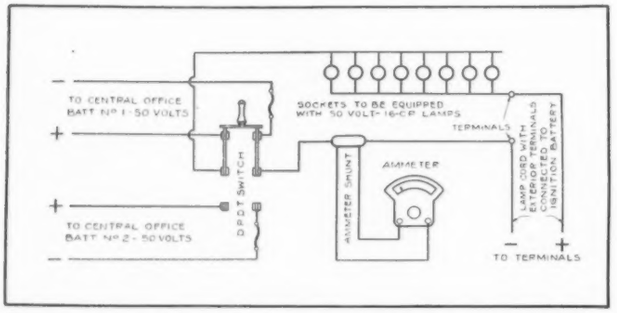
In many cities the owners of automobiles have no satisfactory means of getting their ignition storage batteries charged. In Dowagiac, Mich., where this article was written, the owners of machines using storage cells for ignition either had to send them for charging to the factory where they were made, or to the nearest city where there were advertised facilities for doing this work, which, in this case, was over 100 miles distant. This caused delay, and expense for express charges. Now the telephone office has arranged to do the work, and the batteries are charged without delay, and at a reasonable cost.

The exchange at Dowagiac is equipped with two sets of 50-volt storage batteries which furnish power for operating the automatic switches, ringing machines, and talking circuits. They are charged from a mercury arc rectifier at the rate of 10 amperes, but, of course, the plan hereafter described may be used with any kind of charging apparatus.

The circuit over which current is supplied to charge the ignition batteries is shown in the accompanying drawing. Arrangements are provided in the lamp sockets, connected in multiple, whereby the charging rate may be increased by simply inserting additional lamps. As all automobiles use six-volt batteries, and the exchange batteries furnish current at 50 volts, it is possible to charge quite a number of sets at one time by connecting them in series. The usual charging rate for these batteries is 2, 3, 4 or 5 amperes, according to the size. To reduce the charging current, 50 volt 16 c. p. lamps, which take one ampere each, are used. With a six-volt battery serially connected in the circuit, one ampere will not pass through each lamp, so, when charging a single battery more than three lamps will be needed. In the circuit actually used by the writer, the current is run through an ammeter shunt on the power board, and the reading of the connected instrument shows at just what rate the batteries are charged.

After they are charged to 2.5 volts per cell, the charging rate is cut down to one-half and the charge continued until the voltage of the individual cells again comes up to 2.5 volts.

The arrangement of the outfit for doing this work is very simple, and, although the greatest economy demands that



Circuit for Supplying Current for Charging Ignition Batteries.

various makeshifts shall be employed, no complications are found which represent undesirable practice.

In providing for measuring the charging current and voltage, an ammeter shunt was obtained by using that connected with the circuit of the charging dynamo. As the batteries were charged by the rectifier, and the dynamo was left "spare," its shunt was available for measuring the charging current passing into the ignition batteries. However, if occasion had demanded that the gas engine and dynamo should be used for charging the exchange batteries, it would have been a simple matter to shift the leads so that the current to charge the ignition batteries would pass through the shunt normally connected in the rectifier charging circuit. Even in an exchange where no ammeter shunt is available, it would be quite easy to tell by the voltage used, and the size and number of lamps in multiple, approximately how much current was being passed into the ignition battery. Of course, in figuring on this, allowance would have to be made for the back pressure from the ignition cells, especially, if several were charged at one time.

The double pole, double throw switch was installed so that the ignition batteries could be charged from either exchange battery. It is necessary to charge these cells on the battery not connected to the exchange apparatus, otherwise they would make the talking circuits noisy. With the wiring shown, if exchange battery No. 1 is being charged, the switch would be thrown up, and, with the proper number of lamps in circuit, the ignition battery can be cut in on the charge. Also, if exchange battery No. 1 has been carrying a load for a reasonable length of time and still is far from being discharged, and No. 2 is charged and ready for use, battery No. 2 may be thrown on the exchange, and the discharge of No. 1 completed through the smaller batteries.

The reason for reducing the charge when the voltage is brought up to 2.5 may be of interest. The manufacturers of the ignition batteries recommend a slow charge at a low rate. However, the owner of the automobile having only one battery does not care to wait a day or two to have it charged. Accordingly, it is brought up to 7.5 volts (for the three cells), at the specified charging rate, and then finished at the reduced rate, thus reducing the total time of charging without injuring the cell.

Voltage measurements may be taken by extending wires from the instrument on the wire chief's desk if no portable voltmeter is at hand. The arrangement of equipment is not elaborate. The apparatus is located at one side of the power board, so that the amount of wiring necessary to reach each exchange storage battery circuit is small. As all the labor required to connect an ignition battery is to fasten two wires to the binding posts, and throw the switch to whichever exchange battery is not connected to the switchboard, this, too, is a simple operation, taking little time. The cost of the circuit for doing this work is small, as although lamp sockets, wire and one double pole, double throw knife switch are used, there are few exchanges where such material cannot be found lying idle in the storeroom.

Most of the batteries used are "dry" storage cells, and it is only necessary to pour about a teaspoonful of distilled water, or rain water, into each vent before starting the charge. After the charge is completed, the water which is not taken up is emptied out so that the battery will be clean to handle. With some other types of cell, it is necessary to fill each battery with a weak solution of sulphuric acid and water, made in proportion of about 10 parts of water to one of acid, the excess of which is also emptied after charging; while still another type of ignition battery always carries a solution covering the apparatus, as in an

ordinary open storage battery, and this, of course, requires a little attention.

The cost of doing this work may, perhaps, be easily figured from the following data, in addition to those previously given.

A 60 ampere-hour battery with a charging rate of 3 amperes, will charge in 30 hours, plus four or five hours at the reduced rate.

A 30 ampere-hour battery, with a charging rate of 3 amperes, will charge in 10 hours; or in 15 hours with a rate of 2 amperes. Thus, if a 30 ampere-hour ignition battery is charged from an exchange battery having a charging rate of 10 amperes, it takes three hours longer to charge the exchange battery than would be required if the ignition battery were not charged. It is roughly figured that three hours charging at this rate with the rectifier, on a 220 volt circuit, uses about 3 kilowatt hours at 5 cents per kilowatt hour. Accordingly, the cost of charging, exclusive of labor, in this instance is about 15 cents.

Automobile owners are quite willing to pay 50 cents apiece for charging batteries, or perhaps more. Compared with the loss of time and express charges where the batteries have to be sent out of town, at this figure they make a very considerable saving.

Important Points for the Local Agent to Keep in Mind.*

By C. W. Ayers.

Management can be divided into many different parts, each of which is very important. I think the most important items are service, accounting and care of property.

I consider service the most important to our patrons. To give good service we must keep our plant in good repair and employ only prompt, courteous and obliging operators. Incompetent operators can drive away more business in one month than the agent can build up in six months. It is by giving good service that we make it possible to do our collecting without trouble, and to increase our earnings. To maintain our service properly, I think we should give much attention to such minor troubles as poor batteries, poor ground connections, etc.

The fact that the rural patron can talk to his neighbor is not sufficient. He may wish to talk over the long-distance lines, and because of some minor defects, the service will be such that the operator must repeat for him. This will make him dissatisfied, and will discourage him so that he will not try to use the long-distance lines as often as he otherwise would, thus, causing a loss to the long-distance account.

Accounting is an item which should receive enough careful attention to enable the business to be successfully run, because without an accurate account of the earnings and the expenditures, it is imposisble to know whether the business is operating on a paying basis. For instance, if we receive an application for a telephone to be installed where we are to receive only $5.00 until it is to be removed, how are we to know whether we can afford to make such an installation unless we have a reliable record of the cost of such transactions?

Caring for the property means dollars and cents to the stockholders or owners. Negligence on the part of the manager in this respect soon diminishes the value of the property, as well as the profits of the business.

In closing, I would say that the manager should show the same interest as though the exchange were his own property, and he must depend upon his own judgment for his success. He must endeavor to keep the earnings high, and at the same time the expenditures as low as possible.

I read recently a little item which illustrates my idea of the responsibilities of a manager: "If you work for a man, (or a company), work for him. If he pays you wages that supply your bread and butter, work for him. Stand by him and the institution he represents. If you are not satisfied, resign your position, then when you are outside, curse it to your heart's content, but as long as you are a part of the institution do not condemn it; and remember, that 'I forgot' won't do in business."

* Abstract of a paper read before the Northeastern Iowa Independent Telephone Association, October 15, at Waterloo, Iowa.

Necessity for Small Companies to Figure Profits.

At the convention of the Northeastern Iowa Independent Telephone Association, Mr. A. Gilmore, an expert accountant who has audited the accounts of numerous telephone companies, said:

"The method of making extensions to property from earnings and without injecting new capital, has probably never been carried to such an extreme in any other line as the owners of Independent telephone exchanges have carried it in their business. The inevitable result has been that the profits of the business have been obscured quite generally and even, in several instances, to the extent of frightening away capital that would have been attracted if proper accounting had been practiced and the performances of the property intelligently set forth.

"Many of these Independent companies are unable to use to proper advantage the favorable circumstances which might contribute to their greatest success because they lack that analysis of their investment, their earnings, their expenses, and their profits, which must be had in order to demonstrate unquestionably the real value of their holdings.

"The inevitable result of this lack of analysis is uncertainty as to just what profit there is in the business, and an equal amount of uncertainty as to the real value of the property. This uncertainty as to profits and consequent uncertainty as to the real value of a business is in itself a most serious detriment, because just as in offering five twenty dollar gold pieces for eighty dollars a man can bring discredit upon both his gold and himself, so the telephone man who does not, in his own mind at least, know beyond every possibility of doubt the exact amount of his profits, must, by his uncertainty in this respect bring discredit upon his business, whether he realizes it or not.

"In view of these facts, does it not seem that the Independent telephone people should wake up to a realization of the necessity of installing an adequate system of accounting, so that they may analyze their own value? Has not the time fully arrived for the telephone companies to adopt a uniform accounting system or scheme, the same as other public utility institutions?

"From experience gained through the analysis of the accounts of certain representative telephone companies, I am thoroughly convinced that a careful examination of other companies would disclose facts which would cause the owners to have a higher appreciation of the value of their properties, and that this higher appreciation of the true value of the properties would prevent transactions such as have come to my personal notice, wherein transfers of Independent properties have been made at one-half of their real value, neither the seller being aware of his loss, nor the purchaser being aware of his bargain."

Missouri Pacific Railway Tries Telephone Train Dispatching

During the week of the Missouri State Fair, the Missouri Pacific train dispatchers will operate their trains between Sedalia and the state fair grounds by telephone.

This is understood to be the first test of this system in Missouri, but the officials apparently place a great deal of confidence in the method owing to their knowledge of its success in other places.

LETTERS ON PRACTICAL SUBJECTS

Determining the Relative Efficiency of Similar Equipment from Different Factories.

It undoubtedly has occurred to many who are interested in the advancement of the practical application of the art of telephony, along economic lines, that the prevailing method of rating or describing telephone apparatus and circuits, as practiced by most manufacturing companies in preparing their catalogs and advertising pages for the various trade journals, is most incomplete; so incomplete, in fact, that one looking for any important information can rarely obtain anything but the mere personal opinion of the manufacturer.

At the present time, similar pieces of apparatus or circuits manufactured by different companies generally cannot be properly compared without resorting to expensive laboratory tests, something which small companies cannot make or afford to make. To make these tests successfully, one must be well versed in the art, and must have access to an extensive laboratory equipment. Quite often, the purchase of the apparatus or board is necessary before these tests can be made, which in most cases means that a decision must be made before the purchase, and, therefore, without proper consideration of the relative merits of the different items of equipment obtainable.

The lack of specific information relative to the efficiency and the electrical properties of the various central office, substation and private branch exchange circuits, and their associated apparatus and material, is particularly noticeable when the question determining the economy of a problem is one of transmission, and since this question of transmission can rarely be overlooked, it follows that the present lack of information is felt at almost every turn. The present state of affairs, I believe, may be attributed largely to the fact that the operating companies do not take sufficient interest in the matter and leave the whole question more or less to the judgment of the manufacturing companies, who do not deal directly with the outside plant, and, therefore, have not the incentive to design their apparatus and circuits from the economic point of view, which properly proportions the transmission loss between the various parts of the entire telephone system.

A comparison with the absolute and fixed practice adopted in electric light and power work may be suggestive of what is yet to be done in the telephone field.

For example: Who would consider the purchase of a power transformer without having some definite idea as to its efficiency, power factor, etc.? And what manufacturing company would offer such apparatus without, at least, being able to give this information? On the other hand, how often is the determining factor in the purchase of telephone repeating coils, say for toll lines, anything but the question of their first cost based on a general and inaccurate statement of the manufacturer to the effect that the coils are of the highest efficiency? Let us consider another example: A modern power company is extremely careful to see that its substations fulfill certain specified requirements, and that the losses occasioned by them are known and properly cared for in the distributing and receiving circuits. As a parallel case in the telephone field, we may consider the average private branch exchange, for which few or no specifications are given or required, the determining factor, as before stated, being largely a question of first cost sometimes based on an exaggerated, but superficial and really unimportant feature. Little attention generally is paid to the transmission loss caused by the introduction of private branch exchange circuits into a subscriber's line, or the effect they have on the design of other portions of the system. Many other examples could be cited.

I do not mean to convey the idea that all equipment is not purchased under specifications, but I believe all will agree that it is now very difficult to obtain sufficient information regarding relative efficiency and usefulness of similar apparatus to enable one not highly skilled in the art to distinguish between good and bad apparatus, and to accomplish results in the most economical manner.

Since transmission losses occur in all parts of the telephone system, it is essential that the losses in the different parts be reduced to a comparable basis. In laboratory work, for years, it has been customary to rate all losses originating in the various parts of a telephone system in terms of some standard cable, and when this is once done, the loss equivalents in other forms of cable and open wire circuits may be readily determined. The proper method by which such tests should be made is yet to be settled. There are two general methods now in common use. In one method, the ear is used to obtain a balance; this method is open to the objection that the personal equation cannot be eliminated from the results. In the other method, a current of known frequency, say of the average voice frequency of about 800 periods per second, is measured by a sensitive instrument. This, too, is not perfect, as it does not take proper account of the "quality" of the transmitted speech. But in both methods, by suitable comparative tests, all losses may be given in terms of any arbitrary standard, such as a particular cable.

It is not the purpose of this letter to suggest a method of rating telephone apparatus and circuits, for the subject is far too extensive and the details are too numerous to be considered lightly. I merely wish to bring up the subject as it appeals to me, and to offer the suggestion that the matter be given the careful consideration of all operating and manufacturing companies, and that, if sufficient interest can be aroused in the subject, it be brought up at some future telephone conference with a view of determining the manner in which a comprehensive rating of telephone apparatus and circuits can best be done.

GERALD DEAKIN, Asst. Engr.,
San Francisco, Cal. Empire Const. Co.

Indiana Independents Pleased With Opening of the Clearing House.

The clearing house, organized at last convention of the Indiana Independent Telephone Association, seems to have got well under way, and has already enabled the associated companies to perceive the very material benefits which result from its operation. A large number of offices are now on the list, and a great amount of work on the preparation of records has been accomplished, so that the clearing house committee is now in a position to deal with routine matters and new problems promptly and effectively.

A significant comment from an Independent telephone man on the work of the clearing house and its value is that contained in a letter written on October 23 by Walter J. Uhl, of Logansport, Ind., to Mr. Charles S. Norton, and published in the Bulletin of the Indiana Independent Telephone Association. Mr. Uhl, after complimenting Mr. Coffey upon the efficiency attained so soon after the start of his important work, goes on to relate how the work of the clearing house has resulted in a net saving of approximately $300.00 per year to the Logansport Company, which is already evident. The company further expects a greater volume of business, with consequently increasing earnings, from the fact that the Independent companies in the surrounding territory have already begun to rebuild and construct additional copper circuits, on the assurance that they will receive their pro rata share of all business handled. Some of these circuits are definitely enumerated by name in Mr. Uhl's letter.

Telephone Law

Conducted by A. H. McMillan

Is Feeding Lead Slugs to Slot Machine a Crime?

What sort of offense is it to feed slugs into a slot machine at a telephone pay station, thereby securing long distance service? Is it a breach of faith, petty larceny, false pretense or counterfeiting? We have found in a number of our public pay stations a crop of round lead discs, bearing not the slightest resemblance to the silver quarter of a dollar, but of such weight that they successfully operated the machine. We found five, representing a dollar and a quarter's worth of business, in one booth. We discovered that a young negro was the culprit, and in fact caught him in the act, but when it came to making out a warrant, the city officials were in a quandary. They said it was not false pretense because he did not pretend that the slugs were anything but round bits of lead worth about six cents a pound. It was not larceny because he did not steal anything. It was not breach of faith because no one put any faith in him anyhow, neither was it counterfeiting because the slug did not have the least resemblance to money. Kindly give us your opinion on the subject.

In our opinion the offense charged was uttering counterfeit money. The offense of passing and uttering counterfeit money is defined as the delivering of counterfeit money as money. The coin to be counterfeit must be of a similitude so exact as to impose on persons of ordinary observation using such caution as is ordinarily exercised by prudent men in the particular transaction in which they are engaged. 11 Cyc., 305. So a lead slug of the proper weight and shape as to deceive the operator at the other end of a line when deposited in a telephone slot machine would come within the definition of counterfeit, because it would naturally deceive a person of ordinary observation in such a transaction. We do not believe it necessary that the coin be absolutely such as to deceive an ordinary person if seen. The transaction in this case is the using of it in a slot machine, and if the coin is such as is calculated to deceive a telephone operator by producing the desired result and giving the proper signal over the telephone, it ought to be held to be a counterfeit. There are no decisions in which this matter actually came up, and it would probably require a decision of a court of last resort before it would be absolutely determined.

Damage For Contact by Electric Railway Wires.

About nine years ago our company obtained a franchise and constructed a telephone exchange in this village. A few years afterwards an electric railway obtained a franchise to construct a line through the village. After our poles had been erected along a certain alley and wires were run from the main line to subscribers' residences, the railway company placed its high tension wires on the opposite side of the alley and across our line running to subscriber's residence and so close to them that in July of this year the railway company's high tension wires were blown against one of the wires running to a subscriber's residence, and, as a result, considerable cable was destroyed and our switchboard damaged. Can you cite us any cases decided by the courts wherein such a proposition has come before them for decision? We think we ought to recover from the railway company for the damage we sustained.

Under your statement of fact you are certainly entitled to recover damages from the railway company. Cases establishing this principle are: State vs. Janesville Street Ry. Co., 87 Wis. 72, 4 Am. Elec. Cases, 289, 41 Am. St. R., 23; Central Telephone & Supply Company vs. Wilkesbarre Elec. Ry. Co., 11 Pa. Co. Ct. R., 417, 4 Am. Elec. Cases, 260.

Toll Line Agreement.

C. L. Bland owned and was operating a rural telephone plant, the central office of which was at Sonora, a town of the sixth class, in Hardin county, Kentucky. He entered into a five-year contract with the Cumberland Telephone and Telegraph Company by which he was to rent and install in his service certain instruments from the Cumberland company, and to provide for connecting with the latter's line so as to afford an interchange of business between the two. All messages originating and ending in Hardin county were to be transmitted free on whatever lines they passed over, so far as charges between the contracting partes were concerned. But all messages originating on Mr. Bland's lines destined beyond Hardin county were designated as long distance service, for which he was to receive 15 per cent. of the tolls charged by the Cumberland company for those messages. A controversy arose between the two parties as to Bland's right under the contract to have his patrons' messages originating at some of his pay stations in the country in Hardin county transmitted under the contract over the Cumberland company's lines. The Cumberland company denied him such right, and cut off all connections between the systems about eighteen months before the termination of the contract period. Bland then brought suit against the Cumberland company for damages resulting from its breach of the contract. The defense of the Cumberland company was that Bland had not obtained a franchise from Sonora to operate telephone lines on its streets and alleys as required by Secs. 163 and 164 of the state constitution. These sections provided that no company within a city or town should construct its poles or other apparatus along, over, under or across the streets, alleys or public grounds of a city or town without the consent of its legislative authority, and prohibited the town from granting such consent except on advertisement of sale to the highest bidder. Bland admitted his failure to obtain the franchise in the manner required by the constitution, but averred that many of his subscribers using his instruments were reached by lines that did not go upon or over any public street or alley of Sonora, and that most or all of his rural subscribers were of this class. The Circuit Court for Hardin county gave judgment for the defendant, but this was reversed by the court of appeals of Kentucky, and the case remanded for new trial on the ground that the contract between the parties was severable, and though unenforcible in so far as it related to the use of lines illegally erected within the town, was valid and enforcible as to so much of the business as was done without materially using the streets of the town.

It was also held that a telephone franchise within the sections of the constitution above mentioned was not the right to operate a telephone exchange in a city, but the right to occupy some portion of the public streets for the maintenance of such line.

Bland vs. Cumberland Telephone and Telegraph Co., 109 S. W., 1180.

Special Rates for Co-Partners.

The Interstate Telephone and Telegraph Company of North Carolina charges co-partnerships for the use of one telephone, $3.50 per month. Two physicians were co-partners in "minor surgery" (whatever that may be) and occupied connecting offices used in the business, and as such had one telephone in common. They refused to pay the rate, and the telephone company threatened to remove the instrument. The physicians thereupon brought suit to restrain this removal. The Supreme Court of North Carolina held that the fact that they had private practice not embraced by their co-partnership did not make them any the less co-parners, and so they had to pay the rates asked by the company.

Manning vs. Interstate Telephone and Telegraph Company, 60 S. E., 1134.

Practical Questions and Answers

Power Lost in Resistance or Battery.

A branch exchange which requires 24 volts to operate is drawing one ampere through lamp resistance from a 54-volt storage battery, as in Fig. 1, diagram *A*. Another branch exchange is drawing one ampere through a small 30-volt battery which is opposing the large one, as in diagram *B*.

Is the drop in voltage across the lamps and across the small battery the same, and is the loss of energy in watts the same? The loss in the lamps is in heat and light. If there is any loss in the small battery, how is it used?

The two sketches enclosed by the querist are reproduced in Fig. 1. In the condition at *A* there will be 30 volts

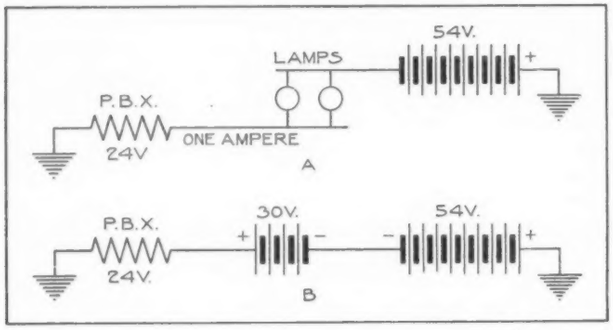


Fig. 1.

across the lamps, this being the difference between the 54 volts of the main battery and the 24 volts of the branch exchange. Since the current is one ampere, the power lost in the lamps is 30 watts. As stated, this energy is dissipated in light and heat and cannot be recovered.

In the condition indicated by diagram *B* the electromotive force across the second battery is 30 volts, the same difference of potential that was found between terminals of the lamps in the diagram above. Since one ampere is flowing, the loss is 30 watts, the same as before. In this case a very small part of the energy is lost in overcoming the internal resistance of the cells, and is wasted in heat. Also considerable is lost in gases which are produced and escape into the air. But the greatest part of the 30 watts goes into chemical changes in the active material of the plates, thereby charging them. This can be recovered by discharging the battery into some circuit where it can perform useful work.

If the 30 volt battery is used merely to cut down the voltage of the main battery, and in so doing is charged indefinitely, the power consumed (30 watts) is all lost, quite as much as in the case of the lamps. The only advantage of using the small battery is that the voltage which the private branch exchange receives will be more uniform than if current is passed through the lamp resistance.

Relations of Induction Coils and Transmitters.

I notice that the induction coils of different makes of telephones are wound to different resistances. Is there any fixed relation or proportion between the resistance of the primary and secondary windings, which is observed when these coils are made up? Is there any particular secondary voltage or pressure which is better for transmission purposes than any other, and which might be lost by the use of transmitters of an unsuitable resistance? How is the rated resistance of a transmitter determined? What relation does it bear to the resistance of the primary winding? Is it possible to measure the voltage in the secondary circuit of a telephone while conversation is being carried on?

There seems to be no fixed relation between the primary and secondary resistances. But the ohmic resistance is a minor consideration compared with the ratio of the number of turns and their relation to each other and the core. The resistance is the result of winding on the required number of turns of wire in a given space. As regards secondary voltage, the higher the better, as long as you do not interfere with the wave form. What we want to produce a loud transmission is that the *current* delivered by the induction coil shall be as large as possible. Some of the older coils had a very high ratio of turns, and produced a relatively high voltage in the secondary. But they had such high resistance (250 ohms, and, in rare cases, 500 ohms), and such great inductance that the greater part of the voltage was wasted in overcoming impediments within the secondary. The resulting current was smaller than is now obtained by a lower generated voltage.

Transmission of different makes and designs will work best with induction coils designed for them. This is because of the relations between the pressure-resistance curve of the transmitter and the average resistance of the primary circuit while talking. This affects clearness rather than loudness. To be loud, the transmitter must have a wide range through which it can vary its resistance, and the primary of the induction coil must be as low in resistance as possible. But this condition will not always give the desired clearness.

The resistance of a transmitter is determined by the voltmeter-ammeter method, shown in Fig. 2. The transmitter, milliammeter, regulating resistance, and battery are connected in series with a switch to open the circuit. A voltmeter is connected across the terminals of the transmitter. If I = current through the transmitter, and E = voltage across it, then its resistance will be

$$R = \frac{E}{I}$$

Since the milliammeter carries the current for both voltmeter and transmitter, the value read from it will be too large. The current taken by the voltmeter must be subtracted to get the true current through the transmitter. If R_V is the resistance of the voltmeter, E its reading, then the current through it will be

$$I_V = \frac{E}{R_V}$$

which subtracted from I_o, the total current, will leave I the true current through the transmitter.

In testing, the transmitter should be shaken up and a steady

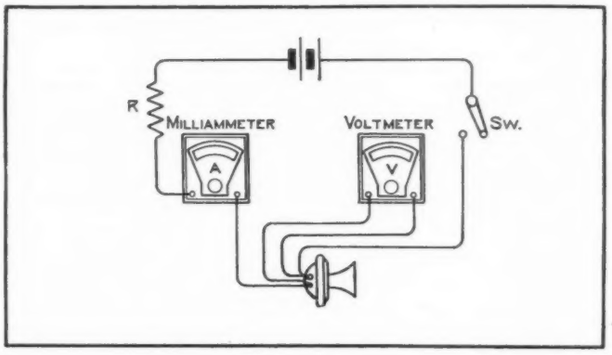


Fig. 2.

note sung into it for a few seconds. This will bring it into a fair working condition. Rate the transmitter by its resistance when quiet. The resistance while singing into it will vary considerably, and is not reliable for comparison. When the current is first passed through a transmitter the current will rise rapidly, then fall slightly, then rise again slowly. If allowed to pass through steadily it will continue to rise more and more slowly for a very considerable time. For purposes of

comparison do not let it run too long. Take the reading when it first steadies.

There is no known relation between this average resistance of the transmitter and that of the primary of the induction coil, except that in general transmitters which have high resistance will work better with the high resistance primary coils. But it has not been reduced to formulae.

It is possible to measure the voltage in the secondary circuit of a telephone while talking, by using the thermo-galvanometer. This is an exceedingly delicate instrument, probably the most sensitive one made for alternating current.

Cause of Greater Resistance of Iron Wire.

Is the following statement correct? "It is observed that iron wires are not suitable for currents rapidly varying in strength which passes through them, such as the alternating current which we use for conveying telephone messages. The reason for this is that a large portion of the energy of such current is wasted in magnetizing the material of the wire, this being due to what is known as electromagnetic inertia of the wire."

The statement is correct, although "electromagnetic inertia of the wire" is better expressed by "inductance."

TO WIRE CHIEFS AND MAINTENANCE MEN.

Clearing of troubles which occur in your exchange, inside or outside, may be made the subject of short, practical letters which will interest other telephone men. These TELEPHONY *will gladly publish, if illustrated by diagrams or photographs. Simply write a description of the nature of the trouble, tests and location, cause found, and method of repair. Payment will be made for all letters published.*

Telephone News

A Telephone Subscriber's View of the Disadvantages of Consolidating Competing Telephone Exchanges.

At Norfolk, Virginia, the Southern Bell Telephone & Telegraph Company is endeavoring to secure from the city council an expression of approval of a plan for consolidating with its local system the property of its competitor. Aside from any question of the legality of such a merger, which is stated on good authority to be absolutely unlawful, a subscriber's comment on its business aspect is of interest. This comment, addressed to the councilmen of Norfolk, Va., and published in the Ledger Dispatch of October 22, 1908, is as follows:

"As a citizen of Norfolk, a subscriber to both telephone systems, and as one having some small experience in the telephone business, I desire to submit for your consideration some facts relative to the proposed merger of the Southern States Telephone Company with the Southern Bell Telephone Company, which is a question to be presented to the Honorable Councils of the city of Norfolk for their consideration.

Investigation of the latest lists of subscribers as published by both companies shows the following:

Norfolk and Berkeley Directory.

No. Bell Co. business telephone subscribers	1912
No. Bell Co. residence subscribers	2640
Total No. Bell subscribers	4552
No. Bell Co. extension station, branch exchanges telephones and hotel room telephones connected to exchange and not shown in above about	2000
No. Southern States business subscribers	1591
No. Southern States residence subscribers	476
Total No. Southern States subscribers	2067
No. business subscribers having both phones	700
No. residence subscribers with both telephones	36
Total subscribers having both telephones	736
No. business subscribers to Bell Co. only	1212
No. business subscribers to Southern States only	891
No. residence subscribers to Bell Co. only	2604
No. residence subscribers to Southern States only	440

Portsmouth.

No. Bell Co. business subscribers	543
No. Bell Co. residence subscribers	750
No. extension and branch stations, about	200
Total No. Bell telephones in Portsmouth	1493
Grand total No. telephones which would be connected to Bell Co.'s exchange as soon as consolidated	9376
Allowing at 10 per cent increase per year on this number, they would have connected Jan. 1, 1913, five years from now	15,097

"According to the Bell company's plan and schedule of rates, they ask for an increase in rates as soon as they have 9000 telephones connected, and from the above it is seen that they could put this increase into effect January 1, 1910.

"This increase would be drawn from the business man of 1212 Bell company subscribers to business telephones 20 per cent, or $1 per month.

"It would decrease the rate to 736 subscribers now using both telephones 25 per cent, or $2 per month. It would increase the rate of 891 Southern States Company's business subscribers 100 per cent, or $3 per month.

"In other words, as soon as the consolidation was in force the Bell company would be getting $28,956 per annum increase for one telephone system over what is now being paid both companies for two separate systems.

"This, however, is only the beginning. When there are $15,000 telephones connected to the Bell exchanges the increase as per their schedule of rates would amount to $134,000 per annum.

"This increase would be drawn from the business man who is now getting on very well with one telephone and from each and every residence in which a telephone is installed.

"The proposed plan would be enormously profitable to the Bell Telephone Company and enormously expensive to the people of Norfolk.

"It means that the Norfolk telephone subscribers would have to pay the purchase price of the Southern States Telephone Company and pay it quick.

"To the business man two telephone systems have advantages over one system to which small importance has been attached in published reports, namely that with a duplicate system he is able to get much better and quicker communication than if only one system was in use. Proof of this from the Bell company is found in their advertisements soliciting parties having frequent calls, and who are often 'busy' to put in two or more of their telephones.

"There are many other reasons why the Bell company should not be given a monopoly as they ask, but I do not intend to discuss this.

"The Retail Merchants' Association, who have recom-

mended consolidation of the two systems, consists of 104 members of whom 25 are subscribers to the Bell company alone, 6 are subscribers to the Southern States company alone, 63 are subscribers to both telephones, and 10 do not have either telephone. A large number of these members have residence telephones, and some have private branch exchanges.

"From the above figures it is seen that they only represent about 3 per cent of the total number of telephone subscribers, and consequently their wishes are not the only ones to be considered.

"In consideration of the above, I would respectfully request that you investigate this matter thoroughly, and if found as I have represented vote and use your influence to defeat the plan which the Bell company propose and also to foster the continuation of the Southern States Telephone Company, run as an Independent exchange, thereby giving to the people of Norfolk the greatest amount and best telephone service for the least amount of money, and saving them an enormous annual amount which would otherwise be paid the Bell Telephone Company.

"Respectfully submitted, Fred W. Walter."

Iowa Independents Reserve Headquarters for International Convention.

Members of the Iowa Independent Telephone Association who attend the International Convention at the Auditorium Hotel, Chicago, December 1, 2 and 3, will have a convenient meeting place in the room which has just been reserved for their headquarters by H. A. Douglas, of Cedar Rapids.

During such time as the convention sessions are not in progress, Mr. W. T. Thill, secretary of the Iowa Independent Telephone Association, will be in charge of this room, and will be glad to give to visitors from other states any information desired concerning methods and conditions in Iowa.

The example of Iowa in establishing state headquarters is a very good one, and there would seem to be advantages to members of other state associations in making similar reservations. Secretary J. B. Ware, of the International Association, has announced his willingness to try to arrange for headquarters for any state associations which may wish to secure rooms for use individually or in combination with other states.

Progressive Independent Telephone Men Create New Association in Northwestern Iowa.

Among the operators of telephone exchanges in the state of Iowa, those in the northwestern section, fully appreciate the benefits which come from assembling at regular intervals to discuss matters of common interest.

A short time ago a new organization was perfected of which the following are officers: W. H. Parker, president, Sanborn, Ia.; E. G. Ross, vice-president, Storm Lake, Ia.; O. L. Loudenslager, secretary, LeMars, Ia.; Howard S. Baker, treasurer, Sioux City, Ia.

Other telephone companies are rapidly becoming interested, and it is expected that the movement in this section will be productive of much good, as it has been in other sections of the state.

The next meeting of this association will be held at Storm Lake, on the second Tuesday in February, 1909.

Outline of Convention Program

Announcement of the main features of the program for the convention to be held by the International Independent Telephone Association at the Auditorium Hotel ,Chicago, December 1, 2 and 3, will probably be made by Secretary J. B. Ware next week. However, it is not too early to say that one of the most important features of the program will be the conference on practical subjects. It is possible, in fact, that several conferences will be going on at one time in different rooms, each one being presided over by a man selected by the program committee on account of his special knowledge of the subject under discussion.

Mr. G. R. Johnston, general manager of the Columbus Citizens Telephone Company, is on the lookout for volunteers to present papers giving the results of their experience on subjects of importance. He will, at the end of next week, announce a complete list of those who have contributed papers, so it is suggested that all new suggestions should be put in his hands immediately.

Among the papers which will be presented as a basis for discussion are the following: Increasing Toll Line Traffic, C. E. Tarte, Grand Rapids; Transmission, A. C. Morse, Cleveland; The Telephone Engineer in his Relation to the Telephone Business, Roy Owens, Columbus; Concrete Poles, W. M. Bailey, Richmond; Pole Preservation, H. P. Folsom, Circleville, Ohio; The Economic Development of Toll Territory, F. F. Fowle, Chicago.

Additional contributions on these same topics, to be presented in discussion, are invited, and members are requested to come prepared to participate in all meetings dealing with subjects in which they are interested.

Other subjects which will come up for discussion, and upon whch much valuable preliminary work is being done by those in charge of these divisions are as follows: Insurance, Jas. B. Hoge, Cleveland, Ohio; Collection Costs, L. E. Hurtz, Lincoln, Nebr.; Cable Crystallization. Telephone managers and engineers are invited to send in short papers describing experiences which have a bearing on any one of these topics to the gentleman having that particular conference in charge, or directly to Mr. Johnston.

The part of the program dealing with the more formal papers has not been fully announced, but it is expected that the convention will be opened by Mr. P. C. Holdoegel, president of the Iowa Independent Telephone Association, and acting president of the International Association. The response to the address of welcome, delivered by Mayor Busse, of Chicago, will be made by Mr. Dwight E. Sapp, of Mt. Vernon, Ohio. A particularly interesting and valuable feature of the meeting will be the review of progress which will be contained in the secretary's report. Two addresses from persons outside the Association which represent a valuable innovation in convention proceedings are those by W. F. Sherfesee, of the United States Forest Service, dealing with the subject of telephone timber supply and preservation; and by Prof. Morgan Brooks, head of the Department of Electrical Engineering of the University of Illinois, who will discuss the development of telephone apparatus from a purely technical and historical point of view. Mr. Geo. H. Raymond, treasurer of the Consolidated Telephone Company, of Buffalo, N. Y., has promised to present a paper on financial features of the telephone business which will be anticipated with much interest, owing to the recognized ability of the author.

The Texas Telephone Convention.

The Texas Independent Telephone Association closed its convention at Dallas on October 26, after electing the following officers to serve during the ensuing year: President, D. A. Walker, San Antonio; first vice-president, E. M. Chamberlain, Greenville; second vice-president, C. B. Luck, Fort Worth; third vice-president, I. W. Sparks, Giddings; secretary, T. A. Gould, Ennis; treasurer, J. B. Earle, Waco. The president was authorized to appoint an assistant secretary to handle official correspondence with members of the association. D. A. Walker was elected delegate to the International convention, with J. B. Earle as alternate.

The first session of the convention was held on October 25. The attendance was good, there being about 75 representatives of the various Independent telephone companies of Texas present. J. B. Earle, of Waco, retiring president of the association, delivered an interesting annual address in which he pointed out the benefits to be obtained by the members of the association through organized and concerted effort. His recommendations as to what should be done were very well received. No one knows the state conditions better than Mr. Earle, operating, as he does, many exchanges and miles of long distance copper circuits. Every member of the association is justly proud of its former president, and believes that in Mr. Earle the Independents of Texas have a champion of the cause second to none in the whole country. He not only says things straight out, but he does the right thing at the right time. He knows the Texas laws, and his opinion is accepted as being very valuable.

C. A. Shock, of Sherman, the retiring secretary-treasurer, made an address on the subject of "Why Should We Have a State Association?" He treated the question in an entertaining and instructive manner.

The following committees were appointed: Legislative—R. A. Walker, San Antonio; Cecil Simpson, Dallas; J. C. Casler, Dallas; J. B. Earle, Waco.

Auditing—A. Smith, Fort Worth; E. M. Chamberlain, Greenville; T. A. Gould, Ennis.

Resolutions—C. B. Luck, Fort Worth; W. E. Osborne, Cleburne; W. T. Renfro, Hillsboro.

A number of addresses on subjects of interest were made and several papers were read. The effect of anti-trust and anti-pass laws on telephone development was discussed by T. P. Stilwell of Lone Oak. He took the position that this character of legislation had encouraged telephone development in Texas.

The matter of buying supplies from the Western Electric Company and the Kellogg Switchboard & Supply Company came up in the meeting. Mr. Earle expressed himself in strong terms relative to this matter. He showed what the Independent manufacturers had done for the Independent companies in the years past, and that these same manufacturers had made it possible, by fighting patents, for each man in the room to have his present plant or position. He said that if it were necessary he would be glad to pay an Independent manufacturer more for a telephone than the Western Electric Company or the Kellogg asked, because in doing so he was helping to maintain the Independent manufacturers, who are necessary if there is to be an Independent telephone system. He believes that this cut in price is to make the others follow, and then cut again, and so on down the line until the manufacturer goes out of business and leaves the operator to struggle alone, at the mercy of his competitor. The following resolution was the result:

Whereas, it is the sense of the Texas Independent Telephone Association that it is contrary to the interests of each member to in any way patronize the Bell telephone interests, either directly or indirectly,

Therefore, be it resolved that we pledge ourselves not to purchase equipment or supplies from the Western Electric Company or the Kellogg Switchboard & Supply Company, except necessary repair parts for apparatus already in use.

"Financing Telephone Properties" was the subject of a paper by D. A. Walker, president and general manager of the San Antonio Telephone Company.

C. W. Emmer, of Beaumont, discussed the matter of "Relation of the Exchange Owner to the Supply Dealer and Manufacturer."

Addresses were also delivered on the subjects: "How to Increase Income and Curtail Expenses," by E. M. Chamberlain, of Greenville: "Rural Lines and Connections," by W. P. Johnson, of Corsicana, and "Value of Tact in the Telephone Feld," by Floyd R. Brown, of Dallas.

The proceedings of the convention were marked with a display of much interest on the part of those present.

Among the visitors were: J. B. Earle, representing the Texas Telephone Company, Waco; T. A. Gould, Ennis; A. A. Seigler, Blue Ridge; W. H. Butler, Floyd; C. E. Graham, Denison; F. T. Hyatt, Gorman; J. W. Martin, Cumby; J. L. McCurdy, Weatherford; W. W. Griffin, Frost; M. E. Osborne, Frost; D. A. Walker, San Antonio; F. S. Eaton, Waxahachie; C. A. Shock, Sherman; J. D. Milburn, Dallas; Harry Knight, Dallas; D. D. Sawyer, Dawson; T. P. Stilwell, Lone Oak; W. P. Winn, Poolville; E. P. Warden, Navarro; Leon Spencer, Gainesville; J. A. Dalton, Godley; Cecil Simpson, Dallas; I. W. Sparks, Giddings; Z. B. McCarver, Whitesboro; R. E. Ragsdale, Collinsville; Charles Pearce, Pilot Point; McD. High, High; R. H. Taylor, Dallas; C. B. Luck, Forth Worth; M. E. Martin, Dallas; A. A. Marrs, Dallas, C. W. Emmer, Beaumont; R. L. Mitchell, Dallas; Royal A. Smith, Dallas; E. G. Kathcart, Dallas; J. F. Bedner, Navasota; W. E. Osborne, Cleburne; J. B. Rotan, Waco; E. M. Chamberlain, Greenville; S. E. Ryan, Paris; C. W. Thomas, Pottsboro; W. T. Renfro, Hillsboro; C. E. Berry, Albilene; J. H. Beach, Hereford; C. F. Speed, Monroe, La.; W. P. Johnson, Corsicana; D. A. Walker, Jr., San Antonio; E. J. Pietzcker, St. Louis; Floyd R. Brown, Dallas; A. L. Hills, Dallas; A. H. Bomar, Dallas; Chas. L. Martin, Dallas.

The following manufacturers and supply dealers were represented: Stromberg-Carlson Manufacturing Company, Rochester, N. Y.; Standard Underground Cable Company, St. Louis; Frank B.. Cook Manufacturing Company, Chicago; North Electric Company, Dallas; Hobson Electric Company, Dallas; Electric Appliance Company, Dallas; Central Telephone and Electric Company, Dallas; Monarch Telephone Manufacturing Company, Dallas; Wesco Supply Company, Fort Worth, Paducah Pole & Timber Company, Paducah, Ky.; Ericsson Telephone Manufacturing Company, Buffalo, N. Y.; Dean Electric Company, Elyria, Ohio.

Long Distance Contract is Not in Unlawful Restraint of Trade.

A contract for the connection of two telephone systems, each occupying distinct territory, whereby a new long distance telephone system is instituted, and the public receives the benefit of competition in long distance business is not invalid as being in unlawful restraint of trade or as creating monopoly, because of a provision therein that the parties thereto shall not compete with each other in their respective territory, nor enter into any contract with any other person, firm or corporation, whereby any of the privileges and advantages acquired thereunder may be impaired. Such is the holding of the Supreme Court of New York sitting in Wayne County in the case of Wayne-Mon-

roe Telephone Company vs. Ontario Telephone Company and the Empire State Telephone & Telegraph Company, decided recently at Rochester, New York.

An action was brought to procure a judgment for the specific performance of a contract made between the complaining company and the Ontario Telephone Company April 14, 1904, and for damages for the breach thereof. The Wayne-Monroe Company had its principal office at Williamston and the Ontario Company had its principal office at Oswego. The contract was in the usual form and contained the usual recitals and agreements found in toll line contracts. The eighth and eleventh clauses provided as follows:

"Eighth. First party agrees not to compete with second party in telephone business, nor to compete with, or take subscribers in territory occupied by exchanges or companies with which second party connects or has contract relations, except upon written consent of second party; and second party agrees not to compete with first party in telephone business, nor to compete with, or take subscribers in territory occupied by exchanges or companies with which first party connects or has contract relations, except upon written consent of first party." * * * *

"Eleventh. The said parties hereto agree not to enter into any contract with any other person, firm or corporation, whereby any of the privileges and advantages herein acquired by either party may be impaired."

Immediately on the execution of the contract the Wayne-Monroe Company and the Ontario Company extended their respective lines and formed a connection at Fair Haven. The Wayne-Monroe Company's business was materially increased as the result of the through toll service, but in July, 1906, the Ontario Company severed its connections at Fair Haven and refused to further carry out the contract. When the action came to trial it was discovered that the stock of the Ontario Company had been purchased by the Empire State Telephone & Telegraph Company (Bell), and the two companies had been consolidated. The Empire State Company was thereupon made a defendant and contended that the contract was void because in restraint of trade, and tending to create a monopoly.

The court found that the contract was not in restraint of trade ,and that instead of creating a monopoly, it acted for the extension of business, and for the public welfare and convenience. Any restraint of trade brought about by the contract was found to be only incidental and contributory to the attaining of the main object of the contract, viz.: The extension of business. The court also held that the contract was enforcible against the purchasing company. Wayne-Monroe Telephone Company vs. Ontario Telephone Company, et al., Supreme Court of New York, Sept. 14, 1908. (See N. Y. S.)

Southern Bell Company Admits Failure to Make Depreciation Charge.

Vice-president W T. Gentry, of the Southern Bell Telephone & Telegraph Company, in testimony before the Industrial Commisison at Norfolk, Va., on Oct. 29, 1908, is reported to have stated that his company was making about 3½ per cent on its investment, allowing no charge for depreciation. He said that a fair return would be an amount sufficient to pay the stockholders 8 per cent, and set aside a sum equal to 3 per cent for maintenance.

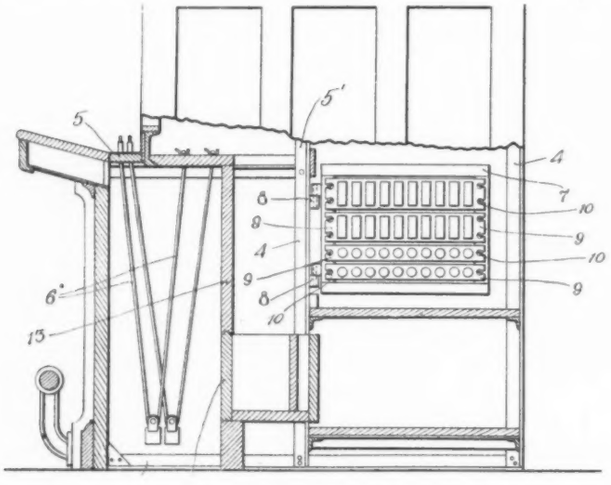
Telephone Patents

Conducted by Max W. Zabel

SWITCHBOARD.

M. S. Conner, Rochester, N. Y., patent 901,688, Oct. 20, 1908.

A new style of switchboard construction is the subject matter of this patent, and as shown in the illustration con-



sists in mounting the jacks, drops, relays, condensers, etc., needing connecting wires, on panels which are hinged, so that they can be moved out to have them accessible from the face of the switchboard.

TELEPHONE RECEIVER HOLDER.

G. J. Thomas, New York City, patent 901,850, Oct. 20, 1908.

In this patent is shown another bracket construction for holding the receiver in position to the talking subscriber's ear when using the telephone, so that both hands are available for taking notes.

TELEPHONE EXCHANGE SYSTEM.

M. S. Conner, Rochester, N. Y., patent 901,686, Oct. 20, 1908.

A new supervisory arrangement for trunk circuits is covered by this patent and the trunk circuit is provided with facilities for permitting intermittent selective signaling. The supervisory and signaling means cause the final application of ringing current to the line to be called, to be delayed until the private exchange operator has made the proper connection with the trunk line, the supervision thereby being entirely automatic in its operations.

The features of the system are a high resistance relay, a low resistance relay, and a main relay adapted upon actuation to substitute the low resistance relay for the high resistance relay, whereby the supervisory relay may operate the cut-off, the controlling relay being transferred to the low resistance relay upon such substitution.

RECEIVER.

J. S. Goldberg, Chicago, Ill., patent 901,704, Oct. 20, 1908.

The operator's receiver covered by this patent consists in general of an outer casing, which is in the shape of a ring, preferably made of magnet steel. The ring is oppositely polarized at diagrammatically opposite sections, at which polar pieces are mounted. The new part is the construction of the casing of magnetic material. The weight of the receiver is reduced by omitting the casing, which in this construction consists of the magnet itself. The diaphragm rests on the edge of the case, and in order to prevent short-circuiting, the diaphragm is preferably made of aluminum or other non-magnetic material, having

a disc of magnetic material at its center near the pole faces. The rear opening of the ring casing is covered by a disc of insulating material, upon the inside of which are mounted the terminal posts, and also the operator's headband.

TELEPHONE TRANSMITTER.

M. S. Conner, Rochester, N. Y., patent 901,687, Oct. 20, 1908.

The telephone transmitter of this patent is designed preferably so that the various parts in the electrode chamber are so arranged that the current passes directly through a very large portion of the comminuted material, so as to increase the range of variation of resistance.

In carrying out this principle, the electrode members connected with the circuit, are mounted upon a flexible wall or diaphragm independent of the main diaphragm, in such manner that upon sound waves being impinged upon the diaphragm there will be relative motion between the electrode members and other associated parts of the electrode chambers. To force the current over the greatest transverse surface of the granulated carbon or comminuted material, the electrodes are made of varying thickness, so as to increase the resistance at the center and force the current to traverse the carbon granules not only at the center, but also at the periphery of the cup, where the resistance in this case would be somewhat less than at the center. The carbon buttons therefore are not flat, as is usually the case in transmitters of this kind.

In the Manufacturing Field

Up in the Cedar District.

The Girard Lumber Company has one of the largest lumber plants in northern Wisconsin, owning thousands of acres of land, its own mills, yards, railroad, hotel, store, and in fact, the entire town of Dunbar. The company's total investment is estimated at $750,000.

Cedar is reported to be still comparatively plentiful in that vicinity, and General Manager J. L. Wells has a good supply of poles of all sizes constantly on hand.

Mr. Wells has been the company's manager for over twenty years, and is one of the best known lumbermen in the country. He gives all of his company's diversified interests his personal attention and, as may be surmised, is consequently a very busy man. In spite of this, he has recently turned car builder, and has turned out an entire train of seven cars to be employed by him and his men in their timber operations the coming season. This train, which has been built entire with the exception of the trucks, comprises two sleeping cars, a kitchen car, dining car, refrigerator car, stock car and office car. It will be operated over the entire system of the company's "D. & G. Railroad" (The Dunbar & Girard), moving the crews and their living quarters from point to point as occasion may require. The illustration is a view of three cars of this train which was taken recently on a side track at Dunbar. Also a picture of Mr. Wells on his electric railway velocipede, inspecting one of his telephone pole yards. With this machine Mr. Wells is enabled to go quickly from one yard to another.

1—Cars Used by Logging Crews Instead of the Old Logging Camps; 2.—The Dunbar Mill of the Girard Lumber Company; 3.—Manager Wells and One of the Pole Yards of the Girard Lumber Company; 4.—The Electric Velocipede Which Mr. Wells Uses for Inspection Tours of the Pole Yards.

The capacity of the Girard Lumber Company is about 5,000 car loads per annum, including manufactured stuff and raw forest products. Its railroad logging system enables it to operate the year around, and its operations are said to amount to over 25,000,000 feet, annually.

The Dean Company's New Salesmen.

Mr. E. B. Gibbs is now representing the Dean Electric Company in the states of Illinois and Wisconsin. He started in the telephone business as a messenger in the Waukon, Iowa, exchange of the Standard Telephone Company, rapidly advancing to "trouble-shooter" and finally to superintendent.

Mr. E. B. Gibbs.

After some time with the Western Union Telegraph Company and the Iowa Telephone Company, where he was engaged in cable work, Mr. Gibbs went with the Kellogg company and later with the Automatic company. Four years ago he joined the switchboard installation department of the Dean Electric Company, and has become familiar with many large exchanges in different parts of the country.

Mr. H. Stephens has been added to the staff of the Dean Electric Company's Kansas City office, taking the place made vacant by the resignation of Mr. W. J. Stanton in the Iowa territory.

Mr. Stephens is quite well known among telephone men of the Middle West. For four years he was in charge of all Bell installations for the Central Union Telephone Company in Indiana. During the past three years he has been city wire chief of the Home Telephone Company in Kansas City. In this position he had an opportunity to become familiar with the various types of Independent telephone apparatus. With his wide knowledge of the telephone business on the operating side, Mr. Stephens is well fitted for his new position.

"What Do You Know About Cypress Poles?"

This is the title of an attractive and very interesting folder, issued by Abeles & Taussig, St. Louis, Mo. This firm carries a large stock of cypress and is prepared to deliver it at low prices. The folder says: "Cypress cannot be beat for strength and uniform taper. Linemen can climb cypress poles without trouble. It contains few knots, is smooth and never suffers butt-rot."

Copper Gossip.

In its latest pamphlet bearing the above title the National Conduit & Cable Company, 41 Park Row, New York, states that manufacturing business has improved over the level of six months ago, but is still much below normal proportions. The consumption of copper, while slowly increasing, is not going ahead fast enough to take care of the large output. Returns compiled for September show that the production of copper in the United States, Mexico and Canada was 10,000,000 pounds greater than in July, and more than 23,000,000 pounds larger than in March. This shows that production is being resumed on a normal scale, as contrasted with the restricted output of the early months of the year.

The circular states the belief of its publishers that it is difficult to see how any immediate important rise in values can be anticipated.

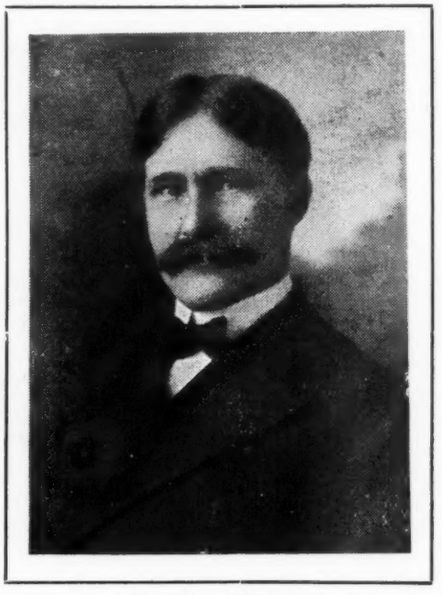
Chicago Electrical Show to Have Many Special Telephone Features.

Considerable interest is being aroused by report that a number of new features of more than ordinary interest to the user of telephone apparatus will be exhibited at the Chicago Electrical Show, to be held January 16 to 30th. Plans for the show are now so well under way that it is expected that Homer E. Niesz, managing director of the Electrical Trades Exposition Company, 1006 Monadnock Block, Chicago, will soon be able to make a preliminary announcement of space assignments, as a very considerable number of the important firms in the electrical trades have now concluded arrangements.

THE AUTOMATIC ELECTRIC COMPANY, of Chicago, Ill., has recently announced that it has secured a contract for the installation of a new switchboard in the central office building which is being erected for the Tri-City Telephone Company, of Clinton, Ia.

Surprise Banquet for Henry Tideman.

Mr. Henry Tideman was recently tendered a grand surprise banquet by the business men of Menominee, Mich., on the occasion of his natal anniversary. Mr. Tideman is president and general manager of the Menominee Electric Manufacturing Company, one of the handsomest establishments in the West, and he not only enjoys a big business in the making of telephone parts, but of electrical apparatus generally. Added to his success as a manufacturer and salesman, Mr. Tideman has acquired a reputation as a lecturer and writer on electrical and scientific subjects, and is in great demand for such purposes. He enjoys an acquaintance which embraces practically all of the leading men of the telephone field.



Mr. Henry Tideman.

Condensed News Reports

Officers of companies are earnestly requested to forward us promptly all financial and other statements as soon as issued and any items of interest as to their plants and systems

PERSONAL.

MR. L. JACKSON has been elected general manager of the Hammonton Telegraph & Telephone Company of Hammonton, N. J.

MR. E. E. NEWMAN of Bryan, Ohio, has been elected manager of the Farmers' & Merchants' Telephone Company of Marshalltown, Ia.

MR. A. E. HARRIS has been appointed manager of the Crookston office of the Northwestern Telephone Exchange Company at Bemidji, Minn.

MR. F. E. PETTIT of Glenwood, Ia., has been promoted to the position of manager of the Iowa Telephone Company's exchange at Red Oak, Ia.

MR. GEORGE PLAYER of St. Louis, Mo., has been chosen as telephone expert for the Oklahoma Corporation Commission. He will make his headquarters at Guthrie, Okla., and will make examinations of the telephone conditions in the state.

NEW COMPANIES.

EATONVILLE, GA.—The Eatonville Telephone Company has filed articles of incorporation. Its capital stock is placed at $6,000, and the incorporators are John G. Spivey, Henry D. Spivey and John C. Spivey.

NASHVILLE, GA.—Articles of incorporation have been filed by the Nashville Telephone Company. The capital stock is $8,000 and the incorporators are F. L. Sweet and J. M. Dent of Coffee county and Jos. A. Alexander and J. D. Lovett of Berrien county.

FRANKFORT, KY.—The Greensburg and Miama Telephone Company of Green county, has been incorporated with a capital of $280. The incorporators are J. L. Booker, C. R. Cabell, J. T. Mercer and others.

SADLER, KY.—The Barren Creek Telephone Company has been organized with a capital stock of $1,300 by K. G. Sadler, Hiram Sadler and Samuel Pense.

DETROIT, MICH.—The Wayne County Telephone Company has filed articles of incorporation to do business in Plymouth. The capital is fixed at $50,000, of which $28,000 is paid in. The incorporators are Edward C. Hough, Chas. A. Fisher, Chauncey H. Rauch, John R. Rauch, John H. Kimbale and others. Messrs. Hough and Rauch are president and secretary of the Plymouth Telephone Company and it is understood that the new company is a reorganization, with increased capitalization.

FARGO, N. D.—The Lawton Telephone Company of Lawton, N. D., has been incorporated with a capital stock of $15,000. The incorporators are: J. A. Aird, Oliver Davidson, Chas. G. Kops and others of Lawton, N. D.

GUTHRIE, OKLA.—The Northeast Oklahoma Telephone Company has been incorporated with a capital stock of $2,000 by D L. Bird, C. L. Pratt, Jr., and D. H. Pratt.

GUTHRIE, OKLA.—The Hollis Telephone Company has been incorporated by J. T. Stevenson, J. B. Hacker and others. The capital stock is $20,000.

GUTHRIE, OKLA.—The Meehan Telephone Company of Meehan has been incorporated with a capital stock of $2,000. The incorporators are: V. Confry, D. C. Franklin, G. W. Stewart and William Valley.

DETURKSVILLE, PA.—The Pinegrove and Cressona Rural Telephone Company has been organized at this place. The officers are: A. J. Tidler, president; George Berger, secretary, and Charles Madenford, treasurer.

IONA, PA.—Some of the citizens of South Lebanon township are considering building a new rural line from Five Points to Iona. This is to be a nucleus from which to extend and cover the entire rich and prosperous farming section southeast of Lebanon, to the South Mountains. Daniel K. Bamberger is president.

NASHVILLE, TENN.—The Limestone Telephone Company of Washington county, has been incorporated with a capital stock of $3,000. The incorporators are S. B. Morelock, J. J. Marshall, B. F. Broyles, W. S. Keehler, J. D. Bright and John Barkley.

RIPLEY, TENN.—Application for charter of incorporation has been filed by the Mack Telephone Company. The capital stock is placed at $600 and the incorporators are: J. A. Hutcheson, J. E. Pierson, W. S. Hutcheson, N. C. Sinclair, D. N. Glenn.

WALLIS, TEX.—The Austin Telephone Company, of Wallis, has been incorporated with a capital stock of $6,000. It intends to operate telephone lines in Austin, Fort Bend, Colorado, Wharton, Brazoria, Matagorda, Waller, Washington, Fayette, Harris and Galveston counties. The incorporators are: F. D. Brandt, G. H. Spoede, E. F. Louwien, W. L. Guyler, W. A. Matthael, F. J. Pietzsch, A. Urbane.

CHARLESTON, W. VA.—The Paradise and Raymond City Telephone Company, of Putnam county, has been chartered for the purpose of constructing and maintaining a telephone line. The capital stock is $20,000, of which $425 has been subscribed. The incorporators are: L. O. Landen, of Sigman; M. R. Sigman, I. A. Hammack, Alfred Meadows and J. W. Foster of Paradise.

MADISON, WIS.—The Bruckerville Farmers' Telephone Company of the town of Holeton, Marathon county, has been incorporated with a capital stock of $1,650. The incorporators are: J. A. Brownell, Joseph Lamer and Fred Mayer.

MADISON, WIS.—The Horseshoe Telephone Company of Carlton, Kewaunee county, has been incorporated with a capital stock of $4,000. The incorporators are Louis E. Erickson, Julius Kolder, George Erickson and others.

FINANCIAL.

JACKSONVILLE, ILL.—The regular semi-annual dividend of 3 per cent, payable November 15, has been declared by the Illinois TelephoneCompany. Since its organization this company has not failed to pay a semi-annual dividend of at least 3 per cent.

LEHIGH, IA.—The capital stock of the Lehigh Telephone Company has been increased from $10,000 to $20,000. The plant will be improved and a new switchboard installed.

OKLAHOMA CITY, OKLA.—The Wilzetta Farmers' Telephone Company has increased its capital stock from $1,500 to $7,500.

FRANCHISES.

DAWSON, GA.—The Dawson Telephone Company which was recently organized has been granted a franchise by the city council. J. H. Davis is general manager.

MORTON, ILL.—The Farmers' Mutual Telephone Company has been granted a twenty-year franchise in this village.

LONG BRANCH, N. J.—The Hudson and Middlesex Telephone and Telegraph Company has been granted a franchise by the Holmdel township committee to build a trunk line from what is known as Old Woman's Bridge to Everett by way of Holmdel.

LA MOURE, N. D.—B. N. Stone has been granted a franchise to install a telephone system in this vicinity.

ORRVILLE, OHIO.—The Smithville council has granted a franchise to the Wayne County Telephone Company.

CONSTRUCTION.

BENSON, ILL.—The Benson Telephone Company contemplates a general overhauling of its system.

BLOOMINGTON, ILL.—The work of rebuilding a part of the Eminence Mutual Telephone Company's lines in Logan county is now going on.

STERLING, ILL.—The Interstate Telephone Company is constructing another toll line between this city and Morrison.

HINDMAN, KY.—The Knott County Telephone Company of which J. A. Draughan, of Hindman, is manager, will shortly begin the construction of a local Independent line from Vest to Republican, a distance of thirteen miles, connecting there with the Hazard line. Considerable construction material will be needed.

SADLER, KY.—The Barren Creek Telephone Company, which was recently organized, will build a system in this place and construct a line to Martin's via Bend, a distance of thirteen miles. Samuel Pense, Sadler, Ky., is manager.

PIKEVILLE, KY.—The Eastern Kentucky Home Telephone Company here has just completed its line from Pikeville, via Shelby, Robinson, Vergie, Etty and Long Fork, Ky., to Baker, Ky., where an important connection has been made with the Letcher County Home Telephone Company's line. Announcement is made that work on a line will be immediately begun from Vergie via Beatrice to Dorton, a distance of 15 miles. N. Starkey is manager.

SOUTH LEEDS, ME.—The Monmouth Telephone Company is putting in a new line in this place.

BAGLEY, MINN.—The Bagley-Ogema Telephone Company has extended its line from Bagley to Weme. The line will also be extended from Convick and other points in Clearwater county.

DETROIT, MINN.—The Floyd Lake telephone line was recently put in service and the Lake Melissa line will be ready for service within a short time.

KEARNEY, NEB.—The Miller Telephone Company is pushing work on its Wild Horse Valley line.

DRAKE, N. D.—A farmers' telephone line has been constructed which will run to within three miles of Anamoose.

BOWESMONT, N. D.—S. K. Bartholomew is making many extensive additions to his telephone system at this place.

HETTINGER, N. D.—The local telephone company will soon complete the installation of apparatus in its exchange.

MINOT, N. D.—A new telephone line has been constructed by the farmers to the north of this city.

INKSTER, N. D.—The Parker Telephone Exchange, which was recently destroyed by fire, will soon be rebuilt.

BEALLSVILLE, PA.—The Bentleyville Telephone Company is building an Independent line from Bentleyville to Ellsworth. This line will be of great service, as it will place Bentleyville in direct communication with Cokeburg, Scenery Hill, Ellsworth and Marianna. Before it was necessary to go through Brownsville being expended upon the system of the Panhandle Telegraph

ABILENE, TEX.—The Orient-Santa Fe Telephone Company has just completed a No. 10 metallic circuit to Abilene from points north and northwest, including Anson, Stamford and Hamlin.

AMARILLO, TEX.—It is stated that more than $200,000 is being expended upon the property of the Panhandle Telegraph and Telephone Company in Amarillo. It is expected that the plant will be completed and ready for service by January 1.

SAN ANGELO, TEX.—The San Angelo Telephone Company is soon to install exchanges at Fort Chadbourne, Mareta and Maryneil. The switchboard for Mareta has just been received and will be installed at once.

WEIMER, TEX.—Several farmers living south of town have joined forces and are building a telephone line to connect their respective farms with Weimar and the outside world.

CLINTWOOD, VA.—The Wise County Telephone & Telegraph Company of Clintwood will begin at once the construction of a telephone line from Clintwood to Banner, Va., a distance of 18 miles. The line will go via Hettie and Bad Creek, giving connection with a hitherto desolate section of country. Construction material and about twenty telephones will be needed. L. M. Vanover, Clintwood, Va., is manager.

HORTON'S SUMMITT, VA.—The Horton's Summitt Telephone Company has just been organized here to construct telephone lines from Horton's Summitt via Fort Blackamore and Duffield to Turkey Cove, and to maintain a local system in and around Horton's Summitt. The incorporators are as follows: George D. Smith, Felix Maggard and Thomas King, with a capital of $2,500, fully paid in. Thomas King of Horton's Summitt, Va., is manager.

SPOKANE, WASH.—The Interstate Telephone Company, whose system principally covers northern Idaho, is planning on extending its line from Spokane to Lewiston early next year. An extension from Harrison to Wallace, Idaho, was completed this year and is now in operation. Many of the principal business houses of this city who do an extensive long distance business have had the company's telephones installed.

ST. CROIX, WIS.—The St. Croix Telephone Company is extending its lines into the Long Lake vicinity.

TABER, ALTA., CAN.—The government telephone system is being rapidly carried forward to completion. The long distance lines are now in operation and the people of Taber are now able to call up all the chief centers in Alberta. The poles for the local system are erected in nearly all parts of the town and it will be ready for operation shortly.

OAXACA, MEX.—Governor Pimentel of this state has put in the district of Tlacolula 220 kilometers of telephone lines and established a central station.

ELECTIONS.

DAWSON, GA.—At a recent meeting of the stockholders of the Dawson Telephone Company the following officers were elected: W. B. Cheatham, president; W. C. Paschal, vice-president, and J. H. Davis, secretary, treasurer and general manager. Directors: W. B. Cheatham, W. C. Paschal, J. H. Davis, S. D. Hatcher, H. A. Petty, J. W. Glass, L. C. Durham, A. M. Raines, A. J. Carver, W. A. Davidson and M. C. Edwards. J. H. Davis S. D. Hatcher and H. A. Petty were named as an executive board.

ATKINSON, ILL.—At the annual meeting of the Henry County Telephone Company the following officers were elected: President, Norman Shearer; vice-president, H. A. Martin; treasurer, J. F. Mowers, and secretary, M. Everett.

CHICAGO, ILL.—At a meeting of the board of directors of the Western Electric Company last week the following officers were elected: President, H. B. Thayer of New York; vice-presidents, H. A. Halligan and William P. Sidley of Chicago, F. R. Welles of Paris; secretary, George C. Pratt of Chicago; general counsel, William P. Sidley; chairman of the board of directors, E. M. Barton.

HOPEDALE, ILL.—At the annual meeting of the Farmers' Telephone Company, held recently, the following officers were elected: W. M. Mount, president; W. H. B. McCormick, secretary, treasurer and manager. Directors: J. J. Unzicker, H. G. Schneider, J. H. Henderson, W. H. B. McCormick and W. M. Mount.

JACKSONVILLE, ILL.—The stockholders of the Illinois Telephone Company have elected the following officers: E. S. Greenleaf, president; J. C. Widenham, vice-president; W. W. Ewing, treasurer; R. A. Gates, auditor and secretary; W. W. Holliday, general manager. Directors, E. S. Greenleaf, J. C. Widenham, E. P. Kirby, C. A. Barnes, A. P. Grout, Winchester; Charles T. Bates, Roodhouse, H. C. Morrow, White Hall; S. E. Simpson, Carrolltown, and E. A. Belknap, Greenfield.

MORRISON, ILL.—The following officers have been elected by the Whiteside Farmers' Mutual Telephone Company: President, C. H. Mason of Fenton; vice-president, H. L. Ewing of Lyndon; secretary, C. E. Johnson, of Morrison; treasurer, R. E. Cochran, of Morrison. Directors, M. I. Fadden of Lyndon, C. E. Weaver of Union Grove and E. McGadden of Ustick.

GREENSBURG, IND.—The following directors were recently elected by the Independent Telephone Company: C. P. Miller, J. H. Christian, Sr., Noah Dashiell, Morgan L. Miers, Walter Pleak, T. W. Robinson and Charles Zoller, Jr.

KIDDER, MO.—At the annual meeting of the stockholders of the Home Mutual Telephone Company of Caldwell county, J. E. Petree, C. A. Orr, I. L. Doll, A. F. Howard, Marks Feltis, H. E. Burrows, J. N. Gittinger, W. A. Black and C. S. Cole were elected directors. The directors organized by the election of the following officers: J. E. Petree, president; A. F. Howard, vice-president; W. A. Black, secretary; J. N. Gittinger, treasurer; J. E. Petree, A. F. Howard, C. A. Orr, construction committee.

PAPILLION, NEB.—At the annual meeting of the stockholders of the Home Telephone Company, the following were elected as a board of directors for the ensuing year: Fred Trumble and C. W. Schobert, Papillion; J. M. Elwell, Springfield; P. J. Langdon and Mike Hughes, Gretna.

BUSKIRKS, N. Y.—The stockholders of the Buskirks and South Cambridge Telephone Company have elected the following directors: Edward Whiteside, Edgar B. Chase, G. Grant Rich, Charles King, Fred M. Dewey, Ira S. Durfee, Edwin T. Cornell, S. S. Sisson and Hermon Beadle. The directors elected Edward Whiteside, president; Edgar B. Chase, vice-president; Ira S. Durfee, secretary, and Fred M. Dewey, treasurer.

MIDWAY, N. C.—The Midway Telephone Company recently elected the following officers: C. E. Snyder, president; A. J. Hartman, secretary and treasurer.

MILLERSBURG, OHIO.—At the annual meeting of the Millersburg, Wooster & Orrville Telephone Company the following officers were elected for the coming year: President, C. M. Lovett, Wooster; vice-president, Frank L. Beam, Mt. Vernon; treasurer, John E. Koch, Millersburg; secretary and manager, M. M. Herron, Millersburg; directors, Frank L. Beam, Mt. Vernon; H. W. Cary, Millersburg; Marion McCoy, C. M. Lovett, Wooster; Otto Troutman, Shreve; D. F. Griffith, Orrville; John E. Koch, Millersburg, and T. E. Steiner, Marshallville.

BURGETTSTOWN, PA.—The stockholders of the Murdocksville Independent Telephone Company elected a board of managers as follows: J. Harper McLarn, Joseph Cooley, A. D. Bigger, W. W. Inglefield, S. L. Saxton. The board later organized by electing J. H. McLarn, president; Joseph Cooley, vice-president; A. D. Bigger, treasurer; W. W. Inglefield, secretary; S. L. Saxton, assistant secretary.

WESTERLY, R. I.—The following officers and directors have been elected by the Westerly Automatic Telephone Company. Dr. John Champlin, president and general manager; Albert B. Crafts, vice-president; Charles E. Sherman, treasurer and J. I. Maxson, secretary. Directors: Dexter B. Potter and Charles T. Howard, of Providence; Henry Sykes and Harry C. Knight, of New Haven, and Robert Drysdale, James A. Welch, George L. Stillman and J. Herbert Macomber, of Westerly.

CAMERON, W. VA.—The new officers of the Farmers' Mutual Telephone Company recently elected are as follows: President, Gray of Rock Lick; vice-president, A. Lowe, of Glen Easton; treasurer, J. J. Lutes, of Rosby's Rock; secretary, J. M. Marshall, of Cameron. Executive committee, R. G. Dakna, chairman, Rosby's; William Aston, Glen Easton; Wilbert Jones, Moundsville; J. M. Fitzsimmons, Viola.

GRAFTON, W. VA.—At the annual meeting of the Consolidated Telephone Company C. E. Manley, of Fairmont, was again elected president and treasurer; B. F. Baily, of Grafton, vice-president; E. F. Hartley, of Fairmont, secretary, and J. Walter Barnes, of Fairmont, general manager. These, together with John Ruhl, of Clarksburg, compose the board of directors.

UNDERGROUND.

SAN JOSE, CAL.—The Pacific Telephone and Telegraph Company will place its wires along Main Street underground.

EUREKA, ILL.—The Roanoke Mutual Telephone Company has been granted a franchise to place its wires under ground.

LEAVENWORTH, KAN.—Mayor Crancer has announced that the telegraph, telephone and electric light companies will be forced to comply with the regulations requiring that all wires within a prescribed district including the business section of the city, shall be placed in underground conduits.

KALAMAZOO, MICH.—It is reported that the Michigan State Telephone Company will spend $100,000 in extending its underground conduit system. About five miles of conduit will be laid, work to be commenced at once.

BELLINGHAM, WASH.—It is said that the Pacific Telephone and Telegraph Company will spend $55,000 next year in extensions to its underground and aerial cable systems in this city.

Samuel G. McMeen Kempster B. Miller

McMeen & Miller

Telephone Engineers
Plans, Estimates, Evaluations, Reports
Consultation Supervision

1454-1458 Monadnock Block . . . . . CHICAGO
787 Market Street . . . . . SAN FRANCISCO

EDMUND LAND

Telephone Engineer

Telephone Development Studies. Preliminary Reports and Estimates, Working Plans and Specifications, Appraisals, Etc. Exchange Construction and Supervision.

No. 15 Jones Building DETROIT, MICHIGAN
Correspondence Solicited

JONES & WINTER

INDEPENDENT
Telephone Engineers and Contractors
1259 Monadnock Building, CHICAGO, ILL.
Write for Our References

H. A. JOHANN O. R. JOHANN

JOHANN & JOHANN

Cable Experts
Installers of Switchboards and Cable Apparatus

COMPLETE EXCHANGE CONSTRUCTION

We positively guarantee all work to be of the highest order. None but skilled workmen employed. Write us for information. Cable trouble earnestly solicited.

PLANS, SPECIFICATIONS and ESTIMATES FURNISHED

PEKIN, ILLINOIS

W. H. CRUMB & COMPANY

Engineers : : Contractors

Telephone Engineering and Construction
Plans, Specifications and Estimates Promptly Furnished

835 Monadnock Bldg., Chicago, Ill.

WALTER C. POLK

TELEPHONE CONSTRUCTION ENGINEER

PLANS, ESTIMATES AND REPORTS
SPECIFICATIONS AND SUPERVISION

742 Ohio Building TOLEDO, O.

FRANK F. FOWLE

Consulting Electrical and Telephone Engineer

Power Transmission and Distribution and problems in alternating current engineering. Design of pole lines and special fixtures. Elimination of inductive interferences between power and telephone systems.

MARQUETTE BUILDING
204 DEARBORN STREET CHICAGO

PATENTS, TRADE MARKS, COPYRIGHTS

MAX W. ZABEL

PATENT ATTORNEY
Associate Member American Institute of Electrical Engineers
Expert Opinions, Investigations, Consultations
260 Dearborn St., Chicago, Ill.

Samuel G. McMeen Kempster B. Miller

McMeen & Miller

Patent Solicitors and Patent Experts

In connection with our telephone engineering practice we make a specialty of securing electrical patents for inventors, and of giving expert advice in patent matters. We also have facilities for marketing meritorious inventions.

1454-1458 Monadnock Block . . . . . CHICAGO
787 Market Street . . . . . SAN FRANCISCO

D. C. & WM. B. JACKSON

MEMBERS AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS
AMERICAN SOCIETY OF MECHANICAL ENGINEERS
AMERICAN SOCIETY OF CIVIL ENGINEERS

ENGINEERS EXPERTS

CHICAGO BOSTON

JOHN STONE W. S. GREEN

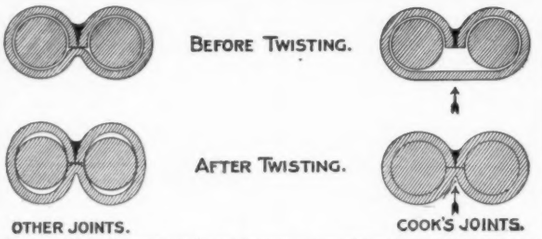
STONE & GREEN

Telephone Exchange Contractors and Engineers
1361 Monadnock Bldg., Chicago

We do all kinds of Telephone Engineering and Construction Work
Correspondence Invited.

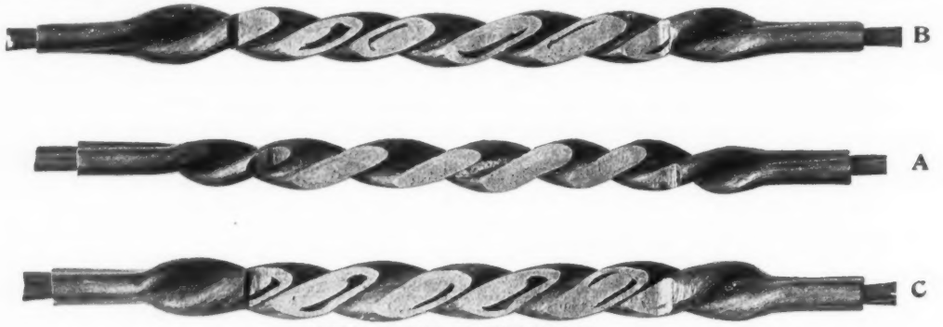
ALPHABETICAL INDEX TO ADVERTISERS

American Battery Co.....18
American Circular Loom Co..22
American Elec. Fuse Co.....14
American Elec. Telo. Co.....30
American Electrical Works...30
American School of Correspondence 12-22
American Wood Preserving Co.18
Andrae & Sons Co., Julius... 8
Armac Motor Co.....28
Automatic Electric Co.....21
Backus-Judd Lbr. & Cooperage Co. 26
Baker & Co..... 1
Beidler & Co., Francis.....25
Belden Mfg. Co.....29
Blake Signal & Mfg. Co.....20
Brixey, W. R..... 1
Brooks Co., Hall.....27
C. A. Mfg. Co.....18
Central Telo. & Elec. Co..... 8
Chance Mfg. Co.....27
Chicago Telo. Supply Co..... 1
Clay Product Co..... 1
Commercial Elec. Supply Co.. 3
Connecticut Telo. & Elec. Co. 20
Cook, Frank B.....16-20
Coolidge, Marshall H.....27
Cracraft, Leich Elec. Mfg. Co. 4
Crumb & Co., W. H.....19
Deal Lbr. Co., L. K.....26
Dean Electric Co.....11
Detroit Insulated Wire Co.... 1
Doty Lumber & Shingle Co...26
Dregge-Grover Lbr. Co.....27
Duluth Log Co.....24
Duplex Metals Co.....29
Durant Elec. Supplies Co....27
Electric Specialty Co.....30
Electrical Engineering Co.....18
Electrical Trade Exposition Co. 23
Ericsson Tel. Mfg. Co., L. M. 9
Fahnestock Electric Co.....30
Faris & Mayhew Lbr. & Pole Co. 27
For Sale Advertisements....28
Fowle, Frank F.....19
Frankel Display Fixture Co...29
French Battery & Carbon Co. 2
Gould Storage Battery Co....10
Gray Telo. Pay Station Co....20
Griffen Lbr. Co., Geo. M.....26
Harding, Geo. 27
Holtzer-Cabot Elec. Co.....20
Hoyt Electrical Inst. Works..28
Huebel Co., C. J.....26
Huron Rubber Co.....28
Indiana Rubber & Ins. Wire Co. 2
Independent Telo. Mfg. Co... 6
Indiana Steel & Wire Co..... 2
Itasca Cedar Co.....26
Jackson, D. C., & Wm. B....19
Johann & Johann.....19
Jones & Winter.....19
Kaye & Carter.....27
Kettle River Quarries Co.....18
Kiblinger & Co., W. H.....12
Klein & Son, Mathias.....30
Krueger & Grant Lbr. Co....26
Land, Edmund 19
Lindsley Bros. Co.....25
Long Distance Telo. Mfg. Co. 6
Mansbridge, G. F.....30
Matthews, W. N. & Bros....27
McMeen & Miller.....19
McRoy Clay Works..... 1
Miller Anchor Co.....18
Milwaukee Elec. Specialties Co. 30
Minnesota Elec. Co..... 2
Monarch Telo. Mfg. Co..... 7
Mountain State Electrical Co. 4
Mueller Co., Wm.....25
National Carbon Co.....28
National India Rubber Co.....30
National Pole Co.....24
Okonite Co., Ltd., The.....1-16
Page & Hill Co.....27
Parker-Kenrick Cedar Co.....26
Partridge Lbr. Co., T. M.....26
Peirce Specialty Co..... 3
Pendleton & Gilkey.....25
Pignolet, Louis M.....18
Polk, W. C.....19
Porter Cedar Co.....26
Premier Elec. Co..... 6
Protective Electrical Supply Co. 8
Reading Standard Co.....12
Roberts Telo. Co., Homer..... 6
Roebling & Sons, John A....22
Royse Electric Co..... 2
Runzel Lenz Elec. Mfg. Co... 3
Schwarze Electric Co.....20
Seymour Mfg. Co.....30
Simplex Electrical Co.....30
Skelley Mfg. Co.....10
Smith Premier Typewriter Co.28
Standard Cedar & Lbr. Co....27
Standard Telo. Mfg. Co..... 4
Standard Underground Cable Co. 1
Sterling & Son, W. C.....26
Sterling Electric Co.....17
Stone & Green.....19
Stromberg-Carlson Telo. Mfg. Co. 5
Sumter Telo. Mfg. Co.....18
Swedish-American Telo. Mfg. Co. 13
Telephone Printing Co..... 2
Veeder Mfg. Co..... 8
Universal Specialty Co.....29
Want Advertisements 28
Waterbury Co. 1
Wesco Supply Co.....15
Western Lbr. & Pole Co.....25
Westinghouse Machine Co...10
Weston Electrical Inst. Co...14
Williams Test Clamp Co..... 2
Wittenberg Cedar Co.....26
Worcester Co., C. H.....25
Wyckoff Pipe & Creosoting Co.30
Yonkers Specialty Co..... 1
Zabel, Max W.....19



Cook Self-Welding Wire Joint

In the Cook Joint the mere act of twisting draws the sleeve into the recess between the wires, stretching it absolutely tight around both wires, making a perfect self-weld.
A joint made with the COOK SELF WELDING JOINT is stronger than the wire itself.
When a twisted joint is cut in two it is impossible to see where the metal in the joint ends and the wire begins.
Moisture or air cannot penetrate and corrode the wire and the joint. The Cook Self-Welding Wire Joint insures a permanently perfect connection.



WIRE JOINT COMPARISON

A—Cook No. 10 with 1 No. 10 and 1 No. 12 Wire. B and C—Competitor No. 10 Joint with 1 No. 10 and No. 12 Wire.

The Cook Joint will give perfect results as a combination joint, when the wires used are not more than two gauges apart. All sizes For Copper or Iron Wire, No. 18 to No. 0000

Frank B. Cook.

242 W. LAKE ST. CHICAGO, ILL.

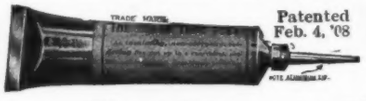
Insulated Staples

5 Sizes

Pat. Nov. 1900

BLAKE
TUBE FLUX for SOLDERING

Full Size of Tube, 1" x 5"

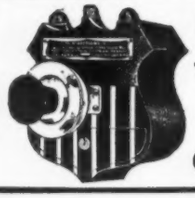


Patented Feb. 4, '08

COMPRESSED CLEATS FOR USE ON PLASTERING

EXACT SIZE PAT. JULY 1906

BLAKE SIGNAL & MFG. CO. WRITE FOR SAMPLES 246 SUMMER ST., BOSTON, MASS.



DO YOU WANT WHAT'S DUE YOU?

THEN INSTALL **GRAY PAY STATIONS** AND YOU'LL GET IT

All details are in Catalog No. 50. Write for a copy.

GRAY TELEPHONE PAY STATION CO., Hartford, Conn.

Perfect Non-Interfering Operation on Exchange Lines

as well as on the local system is only one of the reasons why you should use Connecticut Automatic Inter-communicating Telephones.

Fully described in Catalog 10

CONN. TELEPHONE & ELECTRIC CO., INC.
MERIDEN, CONN.
SEND FOR CATALOG T

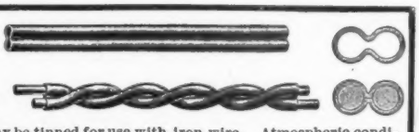
Magneto LOUD RINGING Extension

Telephone Bells

Size of gongs, 2½ in. to 10 in. All resistances. All weather proof. Efficiency, durability and price will interest you.

Schwarze Electric Company
Main Office and Factory: Adrian, Mich.

H.-C. Seamless Tubular Wire Connectors



make a perfect self-welding joint. They are seamless and are drawn up from sheet copper and may be tinned for use with iron wire. Atmospheric conditions cannot impair their efficiency. Write for price lists.

HOLTZER-CABOT ELECTRIC CO.
Factory: Brookline, Mass. 395 Dearborn St., Chicago, Ill.

You must enlarge

your plant. Your switchboard is full, your cable capacity is exhausted. New subscribers are clamoring for service. You must buy more equipment.

Don't buy both

central office equipment and cable. It's no longer necessary, now that we have perfected our multi-office plan of operation. Put your equipment where your subscribers are and save cable. A Keith unit district station will serve 100 or 200 subscribers over 20 to 40 cable pairs on

Either Manual or Automatic Plants,

that is, you can operate semi-automatically, or automatically, just as you choose. The district station is completely supervised from the central office. You can add district stations to your system when and where you please, thereby buying

An Automatic Plant in Installments

as you need and can afford it. You can buy a new district station every three or six months out of your income. You can operate these with manual telephones, then change to automatic, and thus gradually construct an all-automatic plant. Write us for details.

Our automatic system has been adopted in the following cities:

Aberdeen, South Dakota.
Akron, Ohio.
Allentown, Pennsylvania.
Auburn, Maine.
Auburn, New York.
Battle Creek, Michigan.
Beaver Falls, Pennsylvania.
Bellingham, Washington.
Berkeley, California.
Billings, Montana.
Butte, Montana.
Cadillac, Michigan.
Champaign, Illinois.
Chicago, Illinois.
Cleburne, Texas.
Columbus, Georgia.
Columbus, Ohio.
Dayton, Ohio.
Decatur, Illinois.
Dowagiac, Michigan.
Edmonton, Alberta, Canada.
El Paso, Texas.
Emaus, Pennsylvania.
Fall River, Massachusetts.
Grand Rapids, Michigan.
Hastings, Nebraska.
Havana, Cuba.
Hazleton, Pennsylvania.
Holland, Michigan.
Hopkinsville, Kentucky.
Houston, Texas.
Jonesboro, Arkansas.
Kenton, Ohio.
Lake Benton, Minnesota.
Lansing, Michigan.
Lewiston, Maine.
Lincoln, Nebraska.
Los Angeles, California.
Manchester, Iowa.
Marianao, Cuba.
Medford, Wisconsin.
Mount Olive, Illinois.
New Bedford, Massachusetts.
Norfolk, Nebraska.
Oakland, California.
Ocean Park, California.
Omaha, Nebraska.
Pontiac, Illinois.
Portland, Maine.
Portland, Oregon.
Princeton, New Jersey.
Richmond, Indiana.
Riverside, California.
Rochester, Pennsylvania.
Rushville, Indiana.
San Diego, California.
San Francisco, California.
Santa Monica, California.
Saskatoon, Sask., Canada.
Sioux City, Iowa.
South Bend, Indiana.
Spokane, Washington.
St. Marys, Ohio.
Strathcona, Alberta, Canada.
Tacoma, Washington.
Toronton Junction, Canada.
Travers City, Michigan.
Urbana, Illinois.
Van Wert, Ohio.
Washington, Pennsylvania.
Wausau, Wisconsin.
Westerly, Rhode Island.
Wilmington, Delaware.

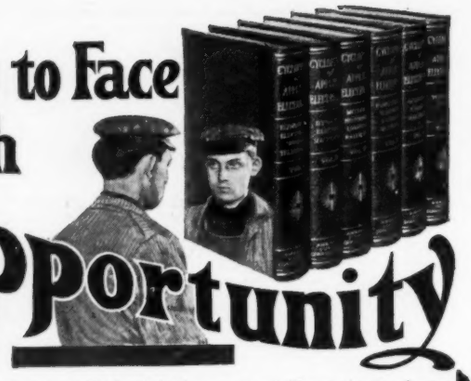
Automatic Electric Company

Van Buren & Morgan Streets

Chicago, U.S.A.

Be sure to see our exhibit at the International Independent Telephone Convention, Rooms 614-16, Auditorium Hotel, December 1st, 2nd and 3rd, 1908

Face to Face With Opportunity



Few of us have sufficient judgment at the outset of our careers to select the **trade** or profession for which we are best suited.

If you are **misplaced**, the sooner you are **displaced**, the better.

To-day you are **face to face with an opportunity** to advance—a chance to become just what you have been waiting to be. Your help, guide and instructor will be the **New Six Volume Edition**

Cyclopedia of

Applied Electricity

The information contained in the 3,000 7x10 inch pages will be found of the utmost value to the man who is face to face with **"Opportunity"** and wishes to grasp it. The 2,000 illustrations, diagrams, tables and formulas greatly increase the value of the books as a Home Study Instructor. The books are handsomely bound in half red morocco and are carefully indexed for ready reference—supplemented with a series of practical test questions.

All types of electrical appliances are given special attention, and every subject treated by a practical, technical expert—written plainly and clearly.

Electricity is the life blood of the telephone. Inventors may do away with "hello girls" and wires, but they cannot telephone without electricity. Every new invention and improvement is only a further application of electricity. The telephone man who wants to get on in his profession must understand electricity thoroughly, so that he can handle the most delicate instruments and complicated appliances. You can get the latest information, in the most understandable form, from these books.

This Cyclopedia was compiled from the representative instruction papers of the American School of Correspondence, and to acquaint the public with the superiority of the School's Home Study Courses, we make this special

FREE FIVE-DAY OFFER

We will send you, express prepaid, a set of these beautiful books absolutely **Free for five days' examination**, on receipt of Coupon. If the books are satisfactory and you wish to keep them, send us $2.00 within five days and $2.00 a month until you have paid the special $18.60 price: otherwise notify us and hold the books subject to our order. Regular price $36.00. It will cost you nothing to examine the books—we employ no agents.

Order promptly and we will include FREE for one year as a monthly supplement, the

TECHNICAL WORLD MAGAZINE

a popular magazine with a technical turn containing the latest discussion on timely topics in Science, Invention, Discovery and Industry, also the best Fiction, Biography, Travel and Humor, in fact, the best of everything. Illustrated with scores of interesting photographs.

BRIEF LIST OF CONTENTS

Telephone Instruments—Telephone Lines—Telephone Exchanges—Common Battery System—Telephone Operation—Telephone Systems—Telephone Maintenance—Automatic Telephone—Wireless Telephony—Electric Wiring—A Modern Central Station Design—The Alternator—The Transformer—Switchboard and Station Appliances—Power Transmission—Mercury Vapor Converter Elements of Electricity—The Electric Current—Electrical Measurements—Electric Telegraph—Wireless Telegraph—The Telautograph—Insulators—Electric Welding—Direct Current Dynamos—Types of Dynamos—Electric Machinery—Direct Current Motors—Electric Motors—Storage Batteries—Electric Lighting—Electric Railways—Management of Dynamo-Electric Machinery—Power Stations.

AMERICAN SCHOOL OF CORRESPONDENCE
CHICAGO, U. S. A.

FREE OFFER COUPON
Fill in, clip and mail today

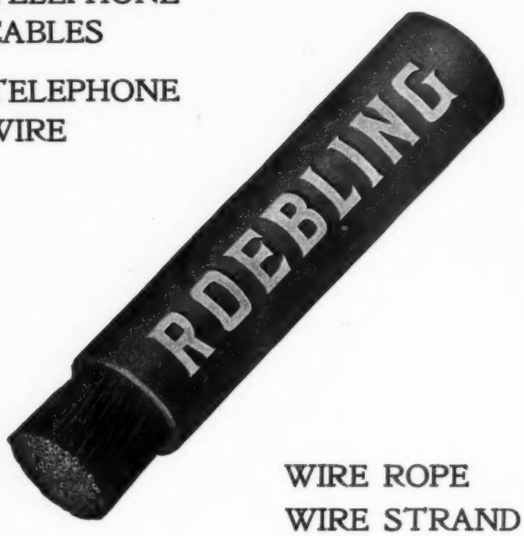
American School of Correspondence:
Please send Cyclopedia of Applied Electricity for **FREE** examination; also T. W. for 1 year. I will send $2.00 within five days and $2.00 a month until I have paid $18.60; otherwise I will notify you and hold the books subject to your order. Title not to pass until fully paid.

Name .....
Address .....
Occupation .....
Employer .....

Telephony. 11-7-08.

TELEPHONE CABLES

TELEPHONE WIRE



WIRE ROPE
WIRE STRAND

JOHN A. ROEBLING'S SONS CO.
TRENTON, N. J.

CIRCULAR LOOM

IN YOUR STORAGE BATTERY ROOM

AMERICAN CIRCULAR LOOM CO.
TRADE MARK REGISTERED

Use Circular Loom for protecting and insulating your battery leads. Place Circular Loom around metal pipes running above the cells to protect them from fumes and to keep metal particles from falling off into the battery. It's neater and better than the ordinary boxing.

You'll find new Circular Loom uses for every day.

Order from your dealer or address

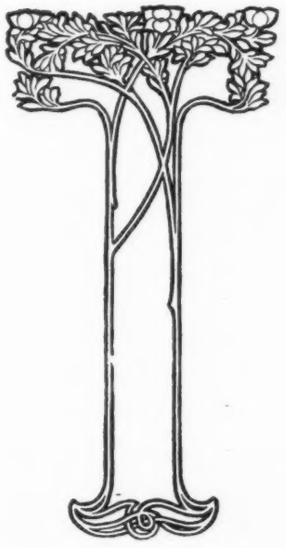
AMERICAN CIRCULAR LOOM CO.
BOSTON, MASS.

NEW YORK CHICAGO SAN FRANCISCO

FOURTH ANNUAL ELECTRICAL SHOW

COLISEUM, CHICAGO

January 16 to 30, 1909
INCLUSIVE



ELECTRICAL TRADES EXPOSITION CO.

CHICAGO

Special Grand Telephone Meeting Jan. 26th and 27th

THE greatest electrical event of each year is this wonderful exposition of electricity. One can gain a greater knowledge of all things electrical by visiting this show than one could otherwise in a life time.

JANUARY 26th and 27th

HAS BEEN SET APART FOR A **GRAND TELEPHONE MEETING** OF TELEPHONE MEN from all over the world. Magnificent telephone exhibits by the largest manufacturers will be installed and will furnish free tickets of admission to their friends and customers upon application.

Arrange for your trip to Chicago during this Exposition. You will be well repaid by the many new inventions and discoveries shown.

ELECTRICITY in all its applied uses will be shown and demonstrated; costly and elegant souvenirs will be given to visiting telephone men, and an entertainment on a lavish scale is being prepared for them.

This will be the greatest and largest gathering of telephone men in the history of the business.

Remember the date, Jan. 16th to 30th, inclusive.

GRAND TELEPHONE MEETING JANUARY 26th AND 27th

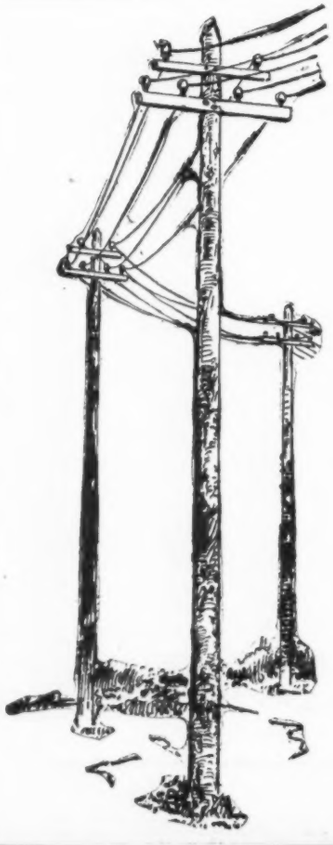
POLES

Awaiting orders for rush shipments at Hawthorne Yard

DULUTH LOG CO.

GENERAL OFFICES:

DULUTH, Second Floor, Palladio Building, MINNESOTA



National Pole Company

Escanaba, Michigan

Successor to the Cedar Department of the

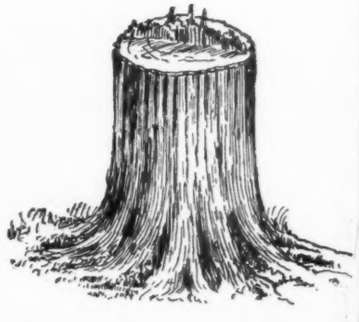
PITTSBURG & LAKE SUPERIOR IRON CO.

Producers and Shippers of

CEDAR POLES

From the Stump to the Line

We carry large stocks of Poles at various points in the States of Michigan, Wisconsin, Minnesota, Idaho, Washington and Maine, and are in position to make immediate shipments at lowest prices and freight rates.



Please tell the Advertiser you saw his Announcement in TELEPHONY.

WESTERN CEDAR **POLES** AND RED FIR **CROSS ARMS**

THE LINDSLEY BROTHERS COMPANY, SPOKANE, WASH.

EASTERN SALES OFFICE
MONADNOCK BLOCK, CHICAGO, ILL.

WE PRODUCE OUR OWN POLES AND MANUFACTURE OUR CROSS ARMS

PENDLETON & GILKEY
MINNEAPOLIS, MINN.

Producers of everything in Cedar

CEDAR POLES

All Sizes Large Stock
Low Prices Prompt Shipments

YARDS:
Mountain, Wisconsin Oconto, Wisconsin

WE MAKE LOW PRICES ON
Idaho Red Cedar Poles
Michigan White Cedar Poles
8 YARDS IN IDAHO—2 IN MICHIGAN
Western Lumber & Pole Co.
Main Office Charles Bldg., Denver, Colo.

White Cedar

POLES
POLES

LARGE STOCK—14 to 65 ft.
Prompt Shipment

FRANCIS BEIDLER & CO.
CHICAGO, ILL.

YARDS:
Marinette, Wis. Escanaba, Mich. Superior, Wis.

Cedar Poles

LARGE BUTTS

We cut poles from lands owned by our Company in Northern Michigan on Lake Superior Shore, where the cedar is very **sound** and **stocky** with **heavy butts.**
All sizes in stock all the year round.

Write for a Copy of Our Telegraph Code for Cedar Products Giving Valuable Information About Poles.

C. H. WORCESTER CO.
1708-1710-1712 Tribune Bldg.
CHICAGO, ILL., U. S. A.

OLDEST CEDAR POLE CONCERN
QUALITY OUR MOTTO
IN THE BUSINESS
IMMENSE STOCKS—ALL SIZES AND LENGTHS
ESTABLISHED 1862
WM. MUELLER COMPANY
MAIN OFFICE
BLANEY, MICH.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

White Cedar Poles

Being producers we can save you jobbers profits.

Yards in Minnesota, Wisconsin, Ontario and Manitoba. Quick shipments anywhere in United States or Canada.

T. M. Partridge Lumber Co.

Minneapolis, Minn.

POLES 20 and 25 foot lengths for rural telephone lines a specialty.

PORTER CEDAR COMPANY

SAGINAW -:- MICHIGAN

PARKER-KENRICK CEDAR CO.

CEDAR POLES

Posts and Ties 349-351 Security Bldg.
MINNEAPOLIS, MINN.

WRITE US FOR PRICES

WHITE CEDAR POLES

A Large Stock of

STRICTLY HIGH GRADE POLES

Send Us Your Inquiries

Wittenberg Cedar Co.

WITTENBERG, WIS.

SPECIAL PRICES
on 6"-25's and Longer

WHITE CEDAR POLES

L. K. Deal Lbr. Co.
900 Clapp Blk., Des Moines, Ia

Geo. M. Griffen Lumber Co.

Oriel Bldg., St. Louis, Mo.

CYPRESS POLES AND PILING From 5"—25' to 8"—70'

Prompt Deliveries - - - Write for Prices

Michigan White Cedar POLES

WILL OUTLAST ALL OTHER KINDS

GET OUR PANIC PRICES. We can fill all sized orders from our own stock 150,000 ON HAND. Twenty-eight years have we been producers.

W. C. STERLING & SON CO.

Principal Office: MONROE, MICHIGAN
Yards: Bay City, Omer, Boyne Falls, Cass City and Monroe

BUY NOW Big Stock Low Prices Quick Delivery **CEDAR POLES**

There'll never be a better chance than now.

KRUEGER & GRANT LUMBER CO.
MINNEAPOLIS, MINNESOTA

POLES

NORTHERN WHITE CEDAR

Give best service. Our prices are lowest. May we quote?
ITASCA CEDAR COMPANY, Deer River, Minn.

DOTY LUMBER AND SHINGLE CO.

Manufacturers of
Washington Fir
Cross Arms. Red
Cedar Poles and Piling
In any Length
PROMPT SHIPMENTS
Doty, Washington

C. J. HUEBEL COMPANY
Room 2, Schale Block, Menominee, Mich.

Michigan White Cedar Poles

Idaho Cedar Poles—all Lengths

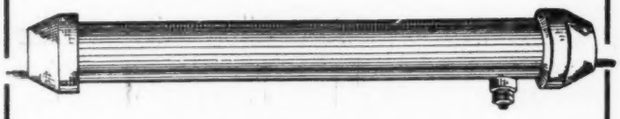
Yards: Menominee, Mich.; Nathan, Mich.; Stager, Mich.; Swanson, Mich.

100,000 WHITE CEDAR POLES

BACKUS-JUDD LUMBER AND COOPERAGE CO.

MINNEAPOLIS, - - - MINNESOTA

DESIGNED BY PRACTICAL MEN



The Sky Rocket Arrester

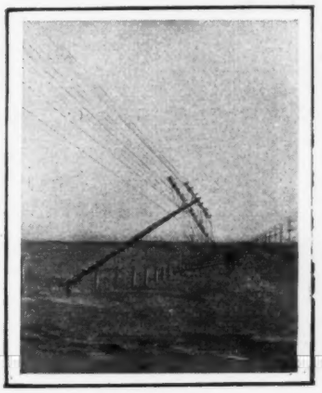
Made for practical work, and they do it right. Their mission is to protect your lines from charges of excessive potential whether due to lightning or other causes, and they fulfill this mission invariably and infallibly.
Details, prices and references await your inquiry.

CHANCE MANUFACTURING CO.

CENTRALIA, MO., U. S. A.

Matthews' Matthews' Matthews' Matthews' Matthews'

ANCHOR EVERY 10TH POLE



ANCHOR EVERY 10TH POLE

Effects of an Iowa sleet storm on a pole line that was not Storm Guyed.

SLEET!

may come any day from now until the first of May 1909.
If you anchor every 10th pole in your long straight leads four ways with four 502 R Matthews Anchors you need not fear.

W. N. MATTHEWS & BROTHER
218 NORTH SECOND STREET :: :: ST. LOUIS

Matthews' Matthews' Matthews' Matthews' Matthews'

THIS NAME STANDS FOR

quick shipments of high-grade Northern White or Idaho Red

CEDAR POLES

Don't forget it. Write for prices.

Page & Hill Co.

MINNEAPOLIS, MINNESOTA

CEDAR TELEPHONE & TELEGRAPH POLES

Marshall H. Coolidge Company

OFFICE
826 Guaranty Building, Minneapolis, Minn.

We produce our own stock! Know the requirements of the trade! Have six large yards and several smaller ones! Can make prompt shipments of any lengths from 16 to 60 feet

These Facts Ought to be Worth Your Attention When Buying Poles!

POLES White or Red Cedar, any length
Ask for delivered prices
FARIS & MAYHEW LUMBER & POLE CO., Denver, Col.

WHITE CEDAR POLES
Producers and Wholesalers Prompt Shipments
Standard Cedar & Lumber Co.
34 SECURITY BANK BLDG., MINNEAPOLIS, MINN.

POLES From stump to consumer. A full assortment of sizes.
KAYE & CARTER, Minneapolis, Minn.

Producers CEDAR POLES
DREGGE-GROVER LUMBER CO.
Cedar Yards { Ozark, Mich. / Spur 461 Soo Line
General Offices { Grand Rapids, Mich.

CEDAR POLES
HALL BROOKS CO., Tomahawk, Wis.

WHITE CEDAR POLES Complete Stock All Sizes
Get my prices before buying GEO. HARDING, Deer River, Minn.

IRONITE DUPLEX DROP WIRE
It won't break
Durant Electric Supplies Co.
58 Fifth Avenue - - Chicago

When a country becomes civilized it demands **typewriters.** When it becomes posted on comparative values it demands

The Smith Premier Typewriter

The fact that the **Smith Premier Typewriter** is used in every civilized country on the globe is not so important as the further fact that the demand increases yearafter year. The reputation of the **Smith Premier** is world-wide. World-wide use has made it so.

The Smith Premier Typewriter Co.
20 E. Van Buren Street :: :: CHICAGO, ILLINOIS

CLASSIFIED ADVERTISEMENTS

TELEPHONE MANAGER AND AUDITOR wishes to locate in a western state. At present has entire charge of system of several exchanges. Past record A 1. Address No. 532, care TELEPHONY.

WANTED—Poition as manager with an Independent company, magneto exchange. 150 to 1,000 telephones. Seven years' experience with Bell Company. Box 33, Brookfield Center, Conn.

POSITION WANTED—By an experienced wire chief and switchboard man; magneto, common battery, automatic, technical education and references. Address No. 531, care TELEPHONY.

CHEMICAL ENGRAVED NAME PLATES and drop numbers. Steel stamped letters and figures. Send for samples and prices. C. H. Hanson, 44 Clark St., Chicago.

WANTED—A position as manager or switchboard man by a technical and practical telephone man. West preferred. Best of references. Seven years' experience. Address No. 527, care TELEPHONY.

EXCHANGE MANAGER, experienced in all departments, desires location in city or five to fifteen thousand inhabitants. Central energy exchange preferred. Address No. 533, care TELEPHONY.

FOR SALE—American Electric switchboard, two sections, 200 drops each (Bell express). Complete with chairs. Good condition, will sell separately. The Herington Telephone Co., Herington, Kansas.

TYPE C 25 VOLTMETER

Diameter of Face, 2 1 2 in. Overall Diameter, 3 in.
D'Arsonval Type
Accurate; dead beat; fully guaranteed. Sent on 30 days' approval. Made in the following ranges: Ammeters 1-100 ampere to 30 amperes. Voltmeters, 1 100 volt to 25 volts.
Price, $7.50 and upwards
Ask for Bulletin AT
Hoyt Electrical Instrument Co.
Penacook, N. H.

TELEPHONE EAR CUSHION Cuts Off All Outside Noises

Samples FORTY CENTS, Prepaid

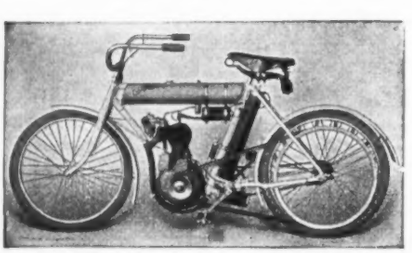
This pneumatic cushion is made of the softest rubber and can be adjusted to the hard gutta-percha receiver very readily. The cushion conforms to the exact shape of the ear as such an air pad alone could, cutting off outside noises and giving the ear a comfortable cushion instead of a rigid receiver. Holds the ear-drum further from the receiver, and by virtue of the air and flabby rubber cushion it neutralizes the harsh crash! crash! noises. Made by
HURON RUBBER COMPANY, CLEVELAND, O.

All Telephone Books

For sale at lowest publishers' price—postage prepaid

Telephony Publishing Co.
341-347 MONADNOCK BLOCK
Chicago, Ill.

ARMAC MOTOR CYCLE

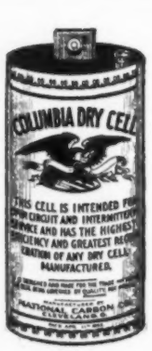


MR. HELLO MAN—

Every day you are losing money when you don't use an ARMAC MOTOR CYCLE for trouble men

Write us today for the figures

ARMAC MOTOR CO.
472 Carroll Ave. CHICAGO, ILL.



THERE IS MORE ENERGY

stored in "COLUMBIA" Dry Cells than any other make. Skeptical? Make a test—note how much more distinctly your 'phones talk—how infrequent replacing is necessary—how few batteries you have to buy compared with other makes.

No Extra Charge for Fahnestock Connections

NATIONAL CARBON CO. CLEVELAND, O.

BELDEN TELEPHONE CORDS

are designed in accordance with approved and time tried principles.

¶ Honest materials, modern machinery and skilled labor combine to make the quality of Belden Cords the highest possible.

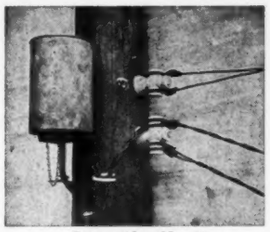
¶ They are explicitly described and clearly illustrated in our No. 4 Catalog so that ordering is facilitated and correct interpretation of your order by us is assured.

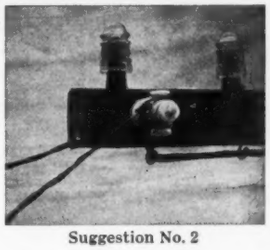
¶ The entire line of Standard Cords listed in our catalog is carried *in stock* for instant delivery.

¶ Our cord prices are right and therefore we are not afraid to print them in our catolog.

¶ Ascertain the truth of these statements by sending us a trial order, an inquiry or at least a request for our No. 4 Catalog if you have not already received one. We are confident your orders will follow.

BELDEN MANUFACTURING COMPANY
194 Michigan Street, Chicago


Suggestion No. 13


Suggestion No. 2

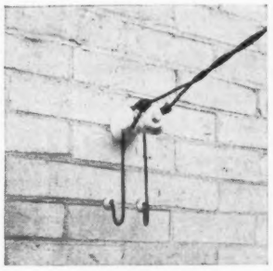
Universal Insulators

SOME ADVANTAGES:

Low first cost.
Cheaper than iron or wood brackets—Easily attached—Labor Saving.
A separate groove for each wire—Grooves for all directions.
Reduced maintenance.

Write for Descriptive Literature

Universal Specialty Company
116 S. Seventh St. Terre Haute, Ind.


Suggestion No. 5

Suggestion No. 8

MONNOT COPPER-CLAD STEEL WIRE

Weighs less, Costs less. Stronger and better than any other wire

CARRIED IN STOCK AT CHICAGO, ST. LOUIS, FORT WORTH

MANUFACTURED BY

Duplex Metals Co., 208 Fifth Ave., New York

Frankel's Electric Testing Clips

SHORT CUTS FOR TROUBLE HUNTERS

You need not waste time baring the wire.

Constructed to test any size line.

Patented Nov. 15, 1904.

THE TEETH grip the line or binding post.

THE PIN pierces the insulation and makes a perfect test connection.

Sample Dozen	12½ Cents Each
100 Lots	11 " "
500 "	10 " "
1000 "	9 " "

FROM YOUR SUPPLY HOUSE OR

FRANKEL DISPLAY FIXTURE COMPANY

733-735 BROADWAY, - - NEW YORK, U. S. A.

American Electric Telephone Co., Chicago

WE ISSUE THE FOLLOWING BULLETINS AND CATALOGUES

Bulletin No. 10—American Express Switchboards.
" " 11—Desks—Toll and Private Branch.
" " 12—Visual Signal and Bell Style Switchboards.
" " 13—Intercommunicating Systems.
" " 14—Line Material and Supplies.
" " 15—Bell Express Self-Restoring Switchboards.
" " 16—Operator's Set and Accessories.
" " 17—Parts of Apparatus
" " 18—Magneto Telephones of all Kinds.

INDEPENDENT LOCAL AND LONG DISTANCE TELEPHONE

Bulletin No. 19—Central Energy Switchboards.
" " 20—Central Energy Telephones.
" " 21—Protective Apparatus and Terminal Equipment.
" " 22—Construction of Country Telephones Lines.
" " 23—Eight-Party Selective Ringing Telephones.
" " 26—Telephone Power and Ringing Equipment.
" " 27—Spanish Edition, Complete Catalogue of Apparatus.
" " 28—Burns Express Type 45 Magneto Switchboard
" " 29—4 Party Harmonic Selective Telephones.

WE SEND THEM POSTPAID, WRITE FOR THEM

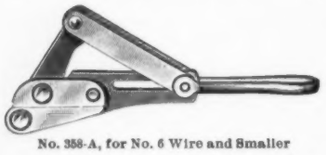
RUBBER COVERED WIRES AND CABLES

For all Classes of HIGH-GRADE ELECTRICAL SERVICE

42 Broadway, New York
N. I. R. Wires and Cables carried in stock by the MONARCH ELECTRIC & WIRE Co., Chicago, Ill.

NATIONAL INDIA RUBBER CO. BRISTOL, R. I.

Klein's New "Chicago Grip"



No. 358-A, for No. 6 Wire and Smaller

is made of steel forging, polished and nickel plated. It is a well-proportioned and reliable tool. The draw link is arranged so it does not fall in the way of the wire. It holds fast on iron or copper wire. Do not fail to have our Catalog on file. It is arranged with Code and List numbers for convenient ordering.

All prominent supply houses carry our products.

MATHIAS KLEIN & SONS
87 W. Van Buren St. Chicago, Ill.

SIMPLEX

PROTECT
EXPOSED CONDUCTORS IN STATION WORK BY
Flameproof Braids
Efficient—Low Cost

INSULATED WIRES and CABLES
RUBBER — CAMBRIC
THE SIMPLEX ELECTRICAL CO - BOSTON

Do You Realize

That the Mansbridge Patent Self-Sealing

CONDENSER

is **Cheaper, Smaller, Lighter** and more **Reliable** than the old style condenser? A **two Microfarad** Mansbridge plate weighs only 5 ounces, has a volume of only 6 cubic inches and **stands 500 volts all the time.** Compare these figures with your own. You can't short-circuit a Mansbridge Condenser! That is why it is called the

"DREADNOUGHT"

Patented by G. F. Mansbridge, St. Margarets, Sanderstead, Croydon, England. Licenses granted for manufacture in U. S. A. and Canada. New York Office, Care of

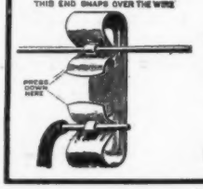
Louis De Jonge & Co., 69 Duane Street

THE SEYMOUR MFG. CO.

SEYMOUR, CONN.

GERMAN SILVER
RESISTANCE SHEET AND WIRE

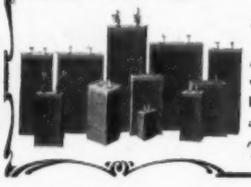
COPPER WIRE
BRASS, BRONZE AND COPPER



Fahnestock "Snap-Over" Connector

For connecting bridging 'phones to party line wire. One end snaps over the tight line wire. No dead end needed. Connects iron wire, copper wire or iron to copper wire. Positive spring contact.

FAHNESTOCK ELECTRIC CO.
129 Patchen Ave. Brooklyn, N. Y.



We Make
Telephone Condensers,

Absolutely Air Tight and Moisture Proof, with High Insulation Resistance, High Break-Down Test and Uniform Capacity, which are Essential to Long Life and Good Service.

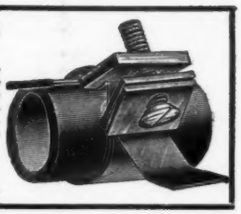
THE ELECTRIC SPECIALTY CO., CRESCO, IOWA.

M. & B. Ground Clamp

"THE CLAMP THAT CLAMPS"

For connecting telephone ground wires to lead or iron pipes. The tighter you set the screw the tighter it clamps. SIMPLE IN CONSTRUCTION, EASY TO ADJUST, FITS ANY SIZE PIPE. No lock nut connection to become loose. Wire soldered to strap. Remains tight whether pipe expands or contracts. No loose connections when our clamp is used.

Cheapest and Best Clamp on the Market
Write us for samples and prices
Milwaukee Electrical Specialties Co. - Milwaukee, Wis.



The Wyckoff Pipe and Creosoting Co., Inc.

(Established 1881)
Manufacturers and Dealers in

CREOSOTED WOOD

Conduits for Underground Wires and Cables, Cross Arms, Poles, Guy Blocks and Lumber

Wood treated by our dead oil of coal tar process will never decay.

Office: 50 Church St., N.Y. City Works: Portsmouth, Va.

AMERICAN ELECTRICAL WORKS

OUR SPECIALTIES:

TELEPHONE WIRES AND CABLES

CHICAGO NEW YORK
135 Adams St. PHILLIPSDALE, R. I. 26 Cortlandt St.